Configuring ELMA to Work under High Load



Business Process Management Software

Contents

Introduction
Chapter 1. General Information 7
Chapter 2. Servers Used10
Chapter 3. Installing and Configuring Failover Cluster for MS SQL Databases
3.1. Installing and configuring MS SQL Server12
3.1.1. Installing MS SQL Server12
3.1.2. Configuring MS SQL Server authentication
3.1.3. Change the MS SQL Server services account 25
3.1.4. Create a database for ELMA
3.1.5. Creating a database for ASPState
3.2. Creating Failover Cluster
3.2.1. Installing the failover component
3.2.2. Creating a failover cluster
3.2.3. Creating a shared folder for storing backup copies
3.2.4. Creating an MS SQL AlwaysOn availability group
3.2.5. Adding databases to the availability group
3.2.6. Creating a database listener in the availability group
Chapter 4. Installing and Configuring MS Web Farm Framework
4.1. Prerequisites
4.2. Installing and configuring IIS60
4.2.1. Installing IIS 60
4.2.2. Configuring IIS 64
4.3. Installing and Configuring Farm Servers
4.3.1. Installing ELMA69
4.3.2. Switching servers to using a single configuration file
4.4. Installing and Creating Cache Cluster79

	4.4.1.	Installing and creating the Redis cache cluster
	4.4.2.	Installing and creating the AppFabric cache cluster
4.5.	Starti	ng the Farm and Creating Extended Configuration Files99
4.6.	Config	guring the farm controller104
Cha	pter 5.	Maintenance120
5.1.	Datab	base maintenance120
	5.1.1.	Creating a database backup copy manually120
	5.1.2.	Compressing transaction log manually123
	5.1.3.	Creating automatic maintenance plan for ELMA databases126
	5.1.4.	Disabling automatic backup upon updating140
	5.1.5.	Recovering a database from a backup copy / moving a database 141
stat	5.1.6. te to sp	Restoring a database from the transaction log / rolling back the ecific time
5.2.	Maint	aining ELMA160
	5.2.1.	Configuring automatic system diagnostics160
	5.2.2.	Gathering ELMA error-logs from several servers161
	5.2.3.	Restarting ELMA farm162
	5.2.4.	Importing configuration via ELMA Designer166
	5.2.5.	Installing and updating packages/components167
	5.2.6.	Updating ELMA farm169
5.3.	Maint	aining Application Servers170
5.4.	Maint	aining File Storage171
5.5.	Maint	aining Controller Server172
Cha	pter 6.	Possible Issues and Trouble Shooting173
6.1.	Recor	mmendations on VM Resource Reservation
6.2.	Solvir	ng Issues with MS SQL Server Installation
6.3.	Solvir	ng Issues with Logging in to MS SQL Server
6.4.	Solvir	ng Issues with Creating ASPState databases

6.5.	Solvir	ng Issues with AppFabric Installation177
6.6.	Solvir	ng Issues with Configuring Controller Server
6.7.	Solvir	ng Issues with Failover Cluster Installation
6.8.	Solvir	ng Issues with Creating MS SQL AlwaysOn Availability Group.184
(5.8.1.	The computer is not a failover cluster node
(5.8.2.	Error opening the failover cluster manager184
e sing	5.8.3. Ie sign	Cannot log in to MS SQL Server with a domain account or via on
6.9.	Solvir	ng Issues with Starting ELMA186
(5.9.1.	No access to the ConfigurationModel.dll file186
e Mult	5.9.2. iSubne	Connection with an MS SQL Server mirror instance with the atFailover parameter is not supported
e curr	5.9.3. ently is	Target database "ELMA3" is included in the availability group and not available for requests
6	5.9.4.	Invalid object name 'ASPState.dbo.ASPStateTempApplications' 190
(5.9.5.	No styles and images in ELMA Web Application190
6	5.9.6.	Error HTTP 500.21 – Internal Server Error
6.10	. Solvir	ng Issues with Working in ELMA193
6	5.10.1.	Warm up193
6	5.10.2.	The system or its components work slowly after warm up 193
(issu	5.10.3. es	The system works slowly on virtual machines without apparent 194
(5.10.4.	MS SQL Server response time is 500-501 ms
(5.10.5.	FastReport reports do not work197
(5.10.6.	Everything is OK, but requests are executed slowly197
Chap	oter 7.	Additional information198
7.1.	Migra	ting user session storage to Redis198
Chap	oter 8.	Useful References201

Introduction

This book is a manual on how to configure ELMA to operate under high load. This book describes how to <u>install and configure the failover cluster for MS SQL</u> <u>Server databases</u> and <u>MS Web Farm Framework</u>. The book also details on how to <u>maintain the system components</u> and <u>solve various issues</u>. It is aimed at specialists, who intend to implement the system on the professional level.

It is assumed, that the user already knows the architecture of ELMA and has the basic skills, which are described in the <u>ELMA BPM Platform user manual</u>. The user is also supposed to be familiar with the basics of ELMA administration, described in the <u>ELMA Administration user manual</u>.

Below is the list of user manuals:

- ELMA BPM Platform user manual
- ELMA Web Portal user manual
- ELMA ECM+ user manual
- ELMA Projects+ user manual
- ELMA KPI user manual
- ELMA Administration user manual

You can find information about all the ELMA functions in ELMA Help. It is available in the ELMA knowledge base: <u>https://kb.elma-bpm.com/help</u>.

Solutions for many technical issues are provided in ELMA knowledge base: <u>https://kb.elma-bpm.com</u>. The knowledge base is constantly updated by the company's specialists.

Chapter 1. General Information

Corporate systems are often designed to support numerous end users – up to several thousands and more. For a system to work under significant load and maintain a sufficient performance, it is necessary to configure the system itself as well as the company's IT infrastructure: match server capacities, account for the network capacity and so on. Scaling up is expensive and not always possible. In this case, it is more reasonable to **scale out**, i.e. deploy an **application farm** to distribute the load.

For example, if you need 1000 users to work at the same time (a back office of 4000 employees), it is more advantageous to have four regular servers than one high power server. The four regular servers will handle the load just as well.

In this manual, the term **high load** is used. The term implies operation of ELMA with numerous concurrent users (more than 300-1000, depending on the intensity of their work), when it becomes more beneficial to increase the number of servers, instead of increasing the capacity of one server.

ELMA web farm is a group of ELMA system servers, linked into a single network that has two-way data transfer and works as a single unit. All the servers work with the same database and use the same cache (**cache cluster**). Certain settings allow connecting several servers to one database and synchronize them.

Roughly, it works like this: a user opens ELMA Web Application and performs a certain action; after that, the system sends a request to ELMA server. The request can be processed not only by the first server, but also by any other server, which is a part of the farm. This way, the server load is distributed among several servers.

In addition, the load is distributed evenly among the servers due to the **load balancer**. It receives requests from users and redirects it to the servers, thus distributing the load. Load balancer can be easily and quickly configured in the IIS manager and does not require resources.

High load on the system is a result of numerous operations carried out in the system. It also often leads to strict requirements to fail-safety: a thousand users cannot wait in case of a crush. **Failover clusters** can help with that. Without clustering, server malfunction causes its network services to become unavailable until the server is functional again. Failover clusters allow writing data to several

databases at the same time. It means that if a server malfunctions, users will be able to continue their work.

When you deploy the system to work under high load, you are supposed to use different server machines for different roles. Among those roles are:

- application servers, that will run the ELMA system;
- DBMS servers, where the database will be deployed;
- controller-server for distributing the load on ELMA servers and user requests;
- server for storing documents, attachments, temporary files and configurations.

Fig. 1 shows the architecture of the web farm, which is used as an example in this manual.



Fig. 1 Web farm architecture

Chapter 2. Servers Used

When you deploy the system to work under high load, you are supposed to use different server machines for different roles. Among those roles are:

- application servers, that will run the ELMA system;
- DBMS servers, where the database will be deployed;
- controller-server for distributing the load on ELMA servers and user requests;
- server for storing documents, attachments, temporary files and configurations.

Servers can be virtual, under the condition that enough resources will be allocated and CPU and memory time reservation will be provided.

Attention! Do not try to save on reservation for virtual servers, use a burdened or an old host-server. If necessary, you will be able to reduce resources later, when the system operates at full capacity. It is much simpler, than gather statistics and diagnose the reasons behind performance drops.

If you expect high load, then you must take into account the peculiarities of using shared resources of the host machine in case of virtual servers. You can find some advice in the section 6.1.

All the servers, listed below, must be in the same domain (ELEWISE, or elewise.local) and you must use a domain account with the local administrator permissions on each of the servers.

It is strongly discouraged to change network addresses and domain names of these servers after deploying the services. Normally, the server domain names will be specified. However, to avoid issues and a long debugging procedure, it is discouraged to change server network addresses after you start configuring the system.

Application servers:

- 93.158.134.3- SRV12-1 SRV12-1.elewise.local
- 213.180.204.3- SRV12-2 SRV12-2.elewise.local

Farm controller server:

• 93.158.134.30- WFCONTROLLER – WFCONTROLLER.elewise.local

Server for files:

• 93.158.134.35- ELMAConfig – ELMAConfig.elewise.local

Database servers:

- 192.168.18.230 DBCLUSTERTEST01 DBCLUSTERTEST01.elewise.local primary replica
- 192.168.18.23 DBCLUSTERTEST02 DBCLUSTERTEST02.elewise.local secondary replica

Database cluster network address:

• 192.168.18.25- SRV12DB – SRV12DB.elewise.local

Domain name for the availability group listener in the network:

• 192.168.18.40- SRV12DBLst – SRV12DBLst.elewise.local

Account for all the services:

• EleWise\ELMAadmin

Note! Do not change the password of this account unless it is necessary!

Since many services work under the same account, changing the password will require stopping all the services, and therefore change account information. Note that restoring all the services may take several hours.

Chapter 3. Installing and Configuring Failover Cluster for MS SQL Databases

This section contains step-by-step instructions for installing and configuring MS SQL Server and for combining two database servers into a single failover cluster.

It is important to understand, that at least one MS SQL server must be installed for the system to work, while the failover cluster is an additional feature for preventing fails and data losses.

Attention! A domain account with permissions to create computers in the domain will be required at one of the steps of installing and configuring the failover cluster.

3.1. Installing and configuring MS SQL Server

Before <u>creating and configuring a failover cluster</u>, you must install and configure MS SQL Server. You should <u>install and configure ELMA web farm</u> only after performing all the settings, described in <u>Chapter 3</u>. Later on, to switch ELMA from using a single MS SQL server to using a database cluster you will only need to change the address in the configuration file.

You need to install MS SQL Management Studio, which is included in most MS SQL Server packages. You can also download it from the <u>official Microsoft</u> <u>website</u>. It is recommended that you use MS SQL Server 2008 R2 or higher.

3.1.1. Installing MS SQL Server

Attention! You need to apply the procedures described below to all database servers you intend to use.

Step 1. Start SQL Server installation center.

After starting the installation software, select **Install** in the left menu and click **New installation or add features to an existing installation** (Fig. 2).



Fig. 2 SQL Server installation center

Step 2. Wait until **Installation wizard** (Fig. 3) initializes the installation files and completes checking global rules. To continue installation, click **Next**.

🎲 SQL Server 2012 Setup		_ 🗆 ×
Setup Support Rules		
Setup Support Rules identify probl before Setup can continue.	ems that might occur when you install SQL Server Setup support files. Failure	es must be corrected
Setup Support Rules Feature Selection Installation Rules Instance Configuration Disk Space Requirements	Operation completed. Passed: 6. Failed 0. Warning 1. Skipped 0. Hide details_<< <u>View detailed report</u>	<u>R</u> e-run
Server Configuration Database Engine Configuration	Rule	Status
Error Reporting	Fusion Active Template Library (ATL)	Passed
Installation Configuration Rules	Previous releases of SQL Server 2008 Business Intelligence Develop	Passed
Installation Progress	No SxS install with SQL Server "Denali" CTP0	Passed
Complete	Consistency validation for SQL Server registry keys	Passed
	Computer domain controller	Passed
	Microsoft .NET Application Security	Passed
	🔥 Windows Firewall	Warning
	< <u>B</u> ack	Next > Cancel Help

Fig. 3 Installation wizard. Setup Support Rules

If there are warnings and/or errors, you must eliminate them before continuing setup. After that, restart the check by clicking **Re-run**.

Step 3. Select a licensing option and click **Next**.

Step 4. Read the licensing agreement.

After reading the agreement, if you agree with it, select **I accept the license terms** (Fig. 4). To continue, click **Next**.



Fig. 4 Installation wizard. Licensing agreement

Step 5. Select components to install.

Check the boxes to left of the components you need. Fig. 5 shows the list of components that must be installed for the system to operate correctly. Other components are optional.

The list of components depends on the version of the SQL Server.

🊼 SQL Server 2012 Setup				
SQL Server 2012 Setup Feature Selection Select the Express features to inst Setup Support Rules Installation Type License Terms Feature Selection Installation Rules Instance Configuration Disk Space Requirements Server Configuration	all. Eeatures: Instance Features ✓ Database Engine Services ✓ SQL Server Replication ✓ Full-Text and Semantic Extractions for Search ✓ Data Quality Services Shared Features Reporting Services - SharePoint	Feature description: The configuration and operation of each instance feature of a SQL Server instance is isolated from other SQL Server instances. SQL Server instances can operate side-by-side on the same computer.		
Server Configuration Database Engine Configuration Error Reporting Installation Configuration Rules Installation Progress Complete	 Reporting Services' Shareform Reporting Services Add-in for SharePoint Products Data Quality Client Client Tools Connectivity Integration Services Client Tools Backwards Compatibility Client Tools SDK Documentation Components Management Tools - Basic Management Tools - Complete SQL Client Connectivity SDK 	Prerequisites for selected features: Already installed: Microsoft .NET Framework 4.0 Windows PowerShell 2.0 Microsoft .NET Framework 3.5 To be installed from media: Microsoft Visual Studio 2010 Shell		
	Select All Unselect All Shared feature directory: c:\Program Files\Microsoft SQL Server Shared feature directory (x86): c:\Program Files (x86)\Microsoft SQL	er\ Server\		
	< <u>B</u> ack	Next > Cancel Help		

Fig. 5 Installation wizard. Selecting components

It is recommended that you use the default directory for installation. To change the default directory, click "...", and select another directory. To continue installation, click **Next**.

Pay attention to the Management Tools. You must install basic management tools and MS SQL Management Studio, which is included in complete management tools.

Step 6. Select an instance to install.

You can install several MS SQL servers on one machine, but we recommend that you install and use the default instance (Fig. 6).

🏶 SQL Server 2012 Setup					
Instance Configuration Specify the name and instance ID) for the instance of SQL Se	rver. Instance ID becom	es part of the installatio	n path.	
Setup Support Rules Feature Selection Installation Rules Instance Configuration Disk Space Requirements Server Configuration Database Engine Configuration Error Reporting Installation Configuration Rules Installation Progress	Default instance Named instance: Instance ID: Instance root directory: SQL Server directory: Installed instances:	MSSQLSERVER MSSQLSERVER C:\Program Files\Micros C:\Program Files\Micros	oft SQL Server\ oft SQL Server\MSSQL1	1.MSSQLSERVER	
	Instance Name	Instance ID	Features	Edition	Version
			< <u>B</u> ack	Next > Cance	Help

Fig. 6 Installation wizard. Instance configuration

You can select Named instance if it is necessary, but it will make the database connection string more complex. You will have to enter the connection information correctly every time it is required by installation of other services and applications.

If an error occurred at this step, you can find possible solutions in the section 6.2.

To continue installation, click **Next**.

Step 7. Make sure that there is enough disk space for the installation of the components.

Step 8. Leave the default settings at the **Server Configuration** step (you can change the account later). To continue installation, click **Next**.

Step 9. Switch authentication mode.

Select **Mixed Mode (SQL Server authentication and Windows authentication)**, and specify a password for logging in as the system administrator (sa), and add the current Active Directory user (Fig. 7).

SQL Server 2012 Setup	-
Database Engine Conf	iguration
Specify Database Engine authent	cation security mode, administrators and data directories.
etup Support Rules icense Terms eature Selection installation Rules instance Configuration isk Space Requirements erver Configuration Patabase Engine Configuration rror Reporting installation Configuration Rules installation Progress icomplete	Server Configuration Data Directories User Instances FILESTREAM Specify the authentication mode and administrators for the Database Engine. Authentication Mode
	Add Current User Add Remove
	< <u>B</u> ack <u>N</u> ext > Cancel Help

Fig. 7 Installation wizard. Database Engine configuration

To continue installation, click **Next**.

Step 10. Skip the following two steps by clicking **Next**.

Step 11. Check the selected components.

At this step (Fig. 8), you can review the list of components selected for installation at the previous steps. If necessary, you can change this list. To do so, return to the required step of the wizard by clicking **Back**.



Fig. 8 Installation wizard. Ready to install

To start installation, click Install.

Step 12. Installation.

At this step, the components are being installed on the computer. This process can take several minutes.

Once the installation has completed, click **Next** to go to the next step.

Step 13. Complete the installation.

At this step, the installation wizard displays the results of installing MS SQL Server. To complete the installation process, click **Close**.

3.1.2. Configuring MS SQL Server authentication

Attention! You need to apply the procedures described below to all the database servers you intend to use. This procedure is necessary to provide the possibility to log in to the ELMA server and cache services database using different accounts (single sign on for the cache and local account for the ELMA server).

This difference is due to the cache peculiarities. It is recommended using a domain account for cache. At the same time, you should use a local DBMS account for the ELMA server in order to avoid the <u>Double-Hop Problem</u>.

In practice, there is only one possibility when the Double-Hop problem may occur for ELMA – when using single sign on. Quite likely, your module configuration excludes the problem; however, we recommended taking safety measures beforehand.

Step 1. Start MS SQL Server Management Studio.

Start MS SQL Server Management Studio (**Start -> SQLServerManagementStudio**) and log in using the **sa** account (Fig. 9), specified during the <u>installation</u>.

In the **Authentication** field, select **SQL Server Authentication** (Fig. 9) from the drop down list. The login and password fields will become available.

Connect to Server							
SQL Server 2012							
Server type:	Database Engine 🔽						
<u>S</u> erver name:	DEMOCE310						
Authentication:	SQL Server Authentication						
Login:	sa						
Password:	*******						
	Remember password						
<u>C</u> onnect	Cancel Help Options >>						

Fig. 9 Connect to Server dialog box

Check the **Remember Password** box.

The first start may take several minutes.

Step 2. Configure server authentication.

In MS SQL Server Management Studio, right click on the **(local)(SQLServer)** pool and select **Properties** in the context menu (Fig. 10).

Kicrosoft SQL Server Mana	agement Studio 📃 🗖	×
File Edit View Debug Too	ols Window Help	
🗄 🖥 • 🖾 • 💕 🖬 🥥 😫), New Query 🛅 📸 📸 👗 🛍 🛍 🔊 - 🔍 - 💷 - 🖳 🕰 🕨 - 📜	
Object Explorer	▼ ╄ ×	
Connect 🕶 🛃 🕎 🔳 🍸 🙀	🗉 🎿 🛛 🗛	
DEMOCE310 (SQL Se Databases		
E Decurity	Disconnect	
🕀 📄 Server Objects	Register	
E Replication		
🛨 📴 Mahayemeni		
	Activity Monitor	
	Start	
	Stop	
	Pause	
	Resume	
	Restart	
	Policies	
	Facets	
	Start PowerShell	
	Reports	
	Refresh	
	Properties	
Ready		h

Fig. 10 Context menu of the "(local)(SQLServer)" pool

In the opened dialog box, select the **Security** page and make sure, that **SQL Server and Windows authentication mode** is selected in the **Server Authentication** unit (Fig. 11).

Select a page Script - 📑 Help	
General	
Memory Processors Server authentication	
Server autrendication	
Connections C Windows Authentication mode	
Database Settings SQL Server and Windows Authentication mode	
	_
Login auditing	
C None	
Eailed logins only	
Successful logins only	
Both failed and successful logins	
Server proxy account	
Enable server proxy account	
Proxy account:	
Password:	
Connection	
Server: Uptions	
Connection: 📃 Enable C2 audit tracing	
sa Cross database ownership chaining	
View connection properties	
Heady	
OK Cano	

Fig. 11 Security page. Server authentication unit

To confirm the settings and close the dialog box, click **OK**.

Step 3. Create a login.

In the object explorer of MS SQL Server Management Studio, open the context menu of the **Security -> Logins** and select **New Login**... (Fig. 12).

K Microsoft SQL Server Management Studio
File Edit View Debug Tools Window Help
: 🛅 🕶 🗃 🚰 🛃 🥥 New Query 🗈 📸 🦓 🐇 🖮 🛍 🤊 - 🔍 - 📮 - 🖳 🕰 🕨 - 🖓
Object Explorer 🗾 👻 🕂 🗙
Connect - 🛃 🛃 🔳 🍞 🛃
DEMOCE310 (SQL Server 11.0.2100 - sa)
Ready

Fig. 12 Context menu. New Login... item

In the opened dialog box, select the **General** page and specify the domain and name of the required user (Fig. 13).

📕 Login - New				
Select a page	🔄 Script 👻 📑 Help			
General Server Roles User Mapping	Login <u>n</u> ame:	DEMOCE310\admin		S <u>e</u> arch
Securables	 Windows authentication SQL Server authentication Password: Confirm password: Specify old password Old password: Enforce password polic Enforce password expire Enforce password expire Mapped to certificate 	ration sword at next login		
	 Mapped to asymmetric key Map to Credential 			Add
	Mapped Credentials	Credential Provider		
Server: DEMOCE310 Connection: sa View connection properties				
				Remove
C Ready	Default <u>d</u> atabase: Default language:	master <default></default>	v	
			OK	Cancel

Fig. 13 Creating a login. General page

Next, open the **Server Roles** page and check all the available boxes (Fig. 14).



Fig. 14 Creating a login. Server Roles page

To save the changes and close the dialog box, click **OK**. After that, you can log in to the system using the created login.

3.1.3. Change the MS SQL Server services account

For the MS SQL server to work correctly in the failover cluster, you need MS SQL services to be started under one domain account.

Attention! You need to apply the procedures described below to all database servers you intend to use.

In this example, 192.168.18.23 and 192.168.18.230.

Step 1. Add the computer to the domain.

The computer must be included in the domain. The domain account, which will be used to log in, must be included in the administrators group of this server.

In this example, the account **EleWise\ELMAadmin** is used.

Step 2. Close MS SQL Server Management Studio and open SQL Server Configuration Manager. Go to **Start -> SQL Server Configuration Manager** (Fig. 15).

Programs (1)	
🚟 SQL Server Configuration Manager	
\wp See more results	
sql server configuration manager	g off 🕨

Fig. 15 Start -> SQL Server Configuration Manager

Step 3. Stop the SQL server.

In the opened window, select **SQL Server Services** and right click **SQL Server (MSSQLSERVER)** to open its context menu. In the context menu, click **Stop** (Fig. 16).



Fig. 16 SQL Server Configuration Manager. Stopping the SQL server

When you stop the SQL server, the SQL Server Agent will also stop.

Step 4. Configure SQL server properties.

Open the properties window of the server, by selecting **Properties** in its context menu (Fig. 17).

SQL Server (MSSQLSERVER) Properties		? ×
AlwaysOn High Availability Startup Para Log On Service	ameters FII	Advanced .
Log on as:		
O Built-in account:		
	~	
• This account:		
Account Name: ELEWISE\ELMAadmi	n	Browse
Password:		
Service status: Stopped		
Start Stop Pause	1	Restart
OK Cancel	Apply	Help

Fig. 17 SQL server properties

In this dialog box, open the **Log On** tab, select **This account** and enter the account information for logging in to the system. In this example, it is **EleWise\ELMAadmin**.

To save the changes and close the dialog box, click **OK**.

Step 5. Start the SQL server.

Start the SQL server by clicking **Start** in the context menu of **SQL Server** (MSSQLSERVER) (Fig. 16).

Repeat steps 3-5 for the SQL Server Agent (MSSQLSERVER).

3.1.4. Create a database for ELMA

Attention! You need to apply the procedures described below to all database servers you intend to use.

In this example, it is 192.168.18.230.

To use ELMA, you must create a database. In this example, it will be named **ELMAPROD38**, but you can name it whatever you like. This name will be used in the ELMA configuration file.

To create a new database, in the object explorer of MS SQL Server Management Studio right click on **Databases** and select **New Database...** in the context menu (Fig. 18).



Fig. 18 Context menu. New Database... item

In the opened dialog box, select the **General** page and enter the database name in the **Database name** field (Fig. 19). In this example, it is **ELMAPROD38**.

- Uptions	Database name: ELMAPP			038		
r Hiegroups	Owner:		<default></default>	<default></default>		
	The full text for					
	Database <u>f</u> iles:					
	Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth / Maxsize	
	ELMAPROD	Rows	PRIMARY	3	By 1 MB, Unlimited	
	ELMAPROD	Log	Not Applicable	1	By 10 percent, Unlimited	
onnection Server						
Connection Server: DEMOCE310						
ionnection Server: DEMOCE310 Connection: sa						
onnection Server: DEMOCE310 Connection: a <u>View connection properties</u>						
onnection Server: EMDCE310 Connection: a View connection properties rogress						
onnection Server: DEMODE 310 Connection: sa View connection properties rogress Ready	4					

Fig. 19 Creating a database. General page

Next, open the **Options** page and perform the following settings (Fig. 20):

- in the **Recovery model** field, select "Full". The full recovery model is required for participating in the AlwaysOn availability group of the failover cluster. It also means that you will need to make backup copies of the transaction log regularly (to learn more, see the section 5.1).
- in the Compatibility level field, select SQL Server 2012 (110). You need to set the compatibility level due to the fact, that core changes were made in the MS SQL Server 110 and higher, which caused some select queries to work longer than usual.

Contrain Collection: Pilegroups Collection: Recovery model: Compatibility level: Containment type: Ither options: Ither options: Ither options: </th <th><default></default></th> <th></th>	<default></default>	
Recovery model: Compatibility level: Containment type: Uther options: Auto Create Statistics Auto Update Statistics Asynchron Default Fulltext Language LCID Default Fulltext Language LCID Default Fulltext Language LCID Default Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Default Cursor Endeduct Cursor Server: Default Cursor Default Cursor Endeut Cursor Endeut Cursor Endeut Cursor Endeut Cursor Endeut Cursor Endeut Cursor </th <th>Simple</th> <th></th>	Simple	
Compatibility level: Containment type: Uther options: Auto Create Statistics Auto Shrink Auto Update Statistics Server: DEMOCE310 Connection: sa If ILESTREAM FILESTREAM FILESTREAM Non-Transacted A Miscellaneous Allow Snapshot Isolation ANSI NULL Default		
Containment type: Uther options: Uther options: Image: Statistics Auto Create Statistics Auto Update Statistics Auto Update Statistics Auto Update Statistics Asynchron Containment Default Fulltext Language LCID Default Fulltext Language LCID Default Language Nested Tiggers Enabled Transform Noise Words Two Digit Year Cutoff DEMOCE 310 Connection: sa Image: View connection properties Progress	SQL Server 2012 (110)	•
Qther options: Qther options: Qther options: Qther options: Auto Create Statistics Auto Shinik Auto Update Statistics Auto Update Statistics Asynchron Containment Default Fulltext Language LCID Default Fulltext Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE310 Connection: sa View connection properties Picestread Progress	None	
Connection Server: DEMOCE310 Connection: Sa Image: Sa View connection properties Yiew connection properties	India	
Connection Server: DEMOCE310 Connection: sa Yiew connection properties Yiew connection properties Yiews connection properties		
Auto Create Statistics Auto Shrink Auto Update Statistics Auto Update Statistics Asynchron Containment Default Fulltext Language LCID Default Fulltext Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE 310 Connection: sa View connection properties Miscellaneous Allow Snapshot Isolation Auto Create Statistics Stever: DEMOCE 310 Endition: Sa View connection properties Miscellaneous Allow Snapshot Isolation ANSI NULL Default		
Auto Shrink Auto Update Statistics Auto Update Statistics Asynchron Containment Default Fulltext Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE310 Connection: sa View connection properties View connection properties Auto Shrink Auto Update Statistics Asynchron Endet Default Fulltext Language Non-Transacted A Miscellaneous Allow Snapshot Isolation ANSI NULL Default	True	
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Auto Update Statistics Asynchron Containment Default Fulltext Language Nested Triagers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE 310 Connection: sa View connection properties View connection properties Auto Update Statistics Asynchron Progress	True	
Containment Default Fulltext Language LCID Default Fulltext Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE310 Connection: sa View connection properties View connection properties Miscellaneous Allow Snapshot Isolation ANSI NULL Default	pusly False	
Default Fulltext Language LCID Default Language Nested Triggers Enabled Transform Noise Words Konnection Server: DEMOCE310 Connection: sa View connection properties View connection properties Yogress		
Default Language Nested Triggers Enabled Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE310 Connection: sa View connection properties Yiew connection properties View connection properties	1033	
Nested Transform Noise Words Transform Noise Words Two Digit Year Cutoff Server: DEMOCE310 Connection: sa If View connection properties View connection properties Allow Snapshot Isolation ANSI NULL Default	English	
Transform Noise Words Two Digit Year Cutoff Connection Server: DEMOCE 310 Connection: sa View connection properties View connection properties Allow Snapshot Isolation ANSI NULL Default	Irue	
Connection Cursor Server: Close Cursor on Commit Enabled DEMOCE310 FILESTREAM Connection: sa Sa FILESTREAM Directory Name FILESTREAM Non-Transacted A Wiew connection properties Allow Snapshot Isolation ANSI NULL Default	False	
Server: Close Cursor on Commit Enabled DEMDCE310 EfflestREAM Connection: sa Image: View connection properties FILESTREAM Non-Transacted A Image: View connection properties Miscellaneous Allow Snapshot Isolation ANSI NULL Default	2043	
Server: Default Cursor DEMOCE310 FILESTREAM Connection: sa Sa FILESTREAM Directory Name FILESTREAM Non-Transacted A View connection properties Miscellaneous Allow Snapshot Isolation ANSI NULL Default	Falso	
DEMOCE310 Connection: sa View connection properties View connection propert	GLOBAL	
Connection: sa FILESTREAM Directory Name FILESTREAM Non-Transacted A View connection properties Allow Snapshot Isolation ANSI NULL Default	GLODAL	
sa FILESTREAM Non-Transacted A View connection properties Allow Snapshot Isolation ANSI NULL Default		
View connection properties Miscellaneous Allow Snapshot Isolation ANSI NULL Default	ccess Off	
Allow Snapshot Isolation ANSI NULL Default		
Progress ANSI NULL Default	False	
	False	
Allow Snapshot Isolation		
C Ready		

Fig. 20 Creating a database. Options page

Note, that for ELMA to work with MS SQL SERVER 2014, you need to select the **MSSQL SERVER 2012** compatibility level.

To save the database and close the dialog box, click **OK**.

3.1.5. Creating a database for ASPState

Attention! You need to apply the procedures described below to all database servers you intend to use.

In this case, it is 192.168.18.230.

An ASPState database is required for ELMA web farm. There are several implementation options for ASPState.

We highly recommend using an ASPState database with permanent table structure storage, since it is the only option that can be successfully used in a failover cluster. **Step 1.** Log in to the main database server using the ELMAadmin account. This account must already have been added to sysadmin in MS SQL Server.

Step 2. Open the command prompt Start -> cmd.exe

Step 3. An ASPState database is created with a special **.NET Framework** utility. To run it in an x64 Windows OS use the following command:

C:\Windows\Microsoft.NET\Framework64\v4.0.30319\aspnet_regsql.exe -S <server name>\<server instance name> -E -ssadd -sstype p

where: **aspnet_regsql.exe** – utility call. By default, the ASPState database creation wizard opens, but it is unnecessary, since the parameters are known.

S – server on which the database should be installed;

E – use the account of the current user;

ssadd – key for creating a new ASPState database;

sstype p – database type with permanent structure storage.

By default, the database is created in RAM and in case of a restart, it has no structure. Due to this, you will have to manually initialize it again.

3.2. Creating Failover Cluster

3.2.1. Installing the failover component

Attention! You need to apply the procedures described below to all database servers that will be included in the failover cluster.

In this example, these are the 192.168.18.23 and 192.168.18.230 servers.

Step 1. Open the Server Manager (**Start -> Server Manager**), go to **Dashboard**, click **Manage** and select **Add Roles and Components** (Fig. 21).

	Server Manager				_	□ ×
Server Ma	nager • Dasł	nboard	• ③		Manage Tools View	Help 25
Dashboard	WELCOME TO SER	VER MANAGER			Remove Roles and Fea Add Servers	itures
All Servers	1 Configure this local server				Create Server Group Server Manager Prope	rties
						Hide
	ROLES AND SERVE Roles: 1 Server gro	ER GROUPS ups: 1 Servers total: ⁻				
	File and St Services	orage 1	Local Server 1		Servers	1
	Manageabil Events Performance	e	Manageability Events Services	Mar Eve Sen	nageability nts vices	
	BPA results		Performance BPA results	Perl BPA	formance A results	

Fig. 21 Server Manager. Dashboard. Manage – Add Roles and Features button

In the wizard for adding roles and features, skip all the steps until the **Features** step, by clicking **Next**. At the **Features** step, check the **Failover Clustering** box (Fig. 22) and click **Next**.

	Add Roles and Features Wizard	_ D X
Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	Select one or more features to install on the selected server. Features Background Intelligent Transfer Service (BITS) BitLocker Drive Encryption BitLocker Network Unlock BranchCache Client for NFS	DESTINATION SERVER SRV2BOOK Description Failover Clustering allows multiple servers to work together to provide high availability of server roles. Failover Clustering is often used for File Services, virtual machines, database applications, and mail applications
	Data Center Bridging Direct Play Enhanced Storage Failover Clustering Group Policy Management IIS Hostable Web Core Ink and Handwriting Services Internet Printing Client IP Address Management (IPAM) Server C III	applications.
	< Previous Next :	> Install Cancel

Fig. 22 Add Roles and Features Wizard. Features step

To start installation of the selected feature, click **Install** at the **Confirmation** step. The installation process may take a long time, wait until it is complete.

Step 2. In the Server Manager, open **Dashboard**, click **Tools** and select **Failover Cluster Manager** (Fig. 23).

2			ver Manager	_ 🗆 X	
			- 3	Manage Tools View Help	
Dashboard	WELCOME TO SERVER	RMANAGER	Cluster-Aware Updating Component Services Computer Management		
 Local Server All Servers File and Storage Services 			gure this local server	Defragment and Optimize Drives Embedded Lockdown Manager Event Viewer Follower Olester Manager	
	QUICK START		roles and features	Failover Cluster Manager ISCSI Initiator Local Security Policy Microsoft Azure Services	
				ODBC Data Sources (32-bit) ODBC Data Sources (64-bit) Performance Monitor	
				Resource Monitor Security Configuration Wizard Services	
	ROLES AND SERVER (Roles: 1 Server groups:	ROUPS		System Configuration System Information Task Scheduler	
	File and Stora Services	age 1	Local Server 1	Windows Firewall with Advanced Security Windows Memory Diagnostic Windows PowerShell	
	(t) Manageability Events Performance		Manageability Events Services	Windows PowerShell (x86) Windows PowerShell ISE Windows PowerShell ISE (x86) Windows Server Backup	
	BPA results		Performance BPA results	Performance BPA results	

Fig. 23 Server Manager. Dashboard. Tools – Failover Cluster Manager button

If you click on this item and an error occurs (Fig. 24), log in to the system using the domain user account (the server must be added to the domain).

		Server Manager		= 🗆 X
Dashboard	WELCOME TO SERVER M	IANAGER		
Local Server All Servers File and Storage Services				
		Warning X	ſ	
		I logged in with a domain user account. A domain user account is required because you need access to Active Directory Domain Services and to all servers in the clutter including comptencements.		Hide
	ROLES AND SERVER GR Roles: 1 Server groups: 1			
	File and Storag Services	7 0K	All Servers	1
	Manageability	Manageability	Manageability	
	Events	Events	Events	
	Performance	Services	Services	
	DPA results	BPA results	BPA results	

Fig. 24 Server Manager. Access error

The following steps of creating a failover cluster will require an account with permissions to create computers in the domain.

3.2.2. Creating a failover cluster

Now you can start creating and configuring a failover cluster.

Attention! You need to apply the procedures, described below, only to one database server that will be included in the failover cluster.

In this example, it is the server 192.168.18.230.

Step 1. Log in to the system using the domain account with permissions to create computers in the domain. You can grant these permissions to the EleWise\ELMAadmin account (if there aren't any) or use the system administrator's account to carry out these steps.

Step 2. Open the Failover Cluster Manager (Fig. 25).

To do so, in the Server Manager open **Dashboard**, click **Tools** and select **Failover Cluster Manager** (Fig. 23). You can also open this manager via **Start** -> **Failover Cluster Manager**.

Railover Cluster Manager	_ 🗆 X
File Action View Help	
Railover Cluster Manager Failover Cluster Manager	Actions
Create failover clusters, validate hardware for potential failover clusters, and perform configuration changes to your	Failover Cluster Manager 🔶
Tailover clusters.	View
v Overview	Refresh
- Overview	Properties
✓ Clusters	Help
▲ Management	
To begin to use failover clustering, first validate your hardware configuration, and then create a cluster. After these steps are complete, you can manage the cluster. Managing a cluster can include copying roles to it from a cluster running Windows Server 2012 R2. Windows Server 2008 R2.	
W Validate Configuration	
Create Cluster	
In Connect to Cluster	
More Information	
Failover cluster topics on the Web	
Failover cluster communities on the Web	
Microsoft support page on the Web	


Fig 3. Create a failover cluster.

Attention! The failover cluster creation wizard also starts the configuration validation wizard, while it stays at the initial steps.

To create a failover cluster, click **Create a Cluster...** in the work pane of the **Failover Cluster Management** panel. The cluster creation wizard will open. The first step **Before you begin** is a welcome screen, you can skip it by clicking **Next**.

At the second step, **Select Servers** (Fig. 26), add the names of the required servers and click **Next**. Make sure that the failover feature is installed on all of the selected servers.

In this example, these are the servers 192.168.18.23 and 192.168.18.230. Order is irrelevant.

a		Create Cluster Wizard	x
Select Se	ervers		
Before You Begin	Add the names of all the s	ervers that you want to have in the cluster. You must add at least o	ne server.
Select Servers			
Validation Warning			
Access Point for Administering the	Enter server name:		Browse
Cluster	Selected servers:	srv 1-2book.book.local	Add
Confirmation		STV2-2DOOK.DOOK.JOCAI	Remove
Creating New Cluster			
Summary			
		< Previous Next >	Cancel

Fig. 26 Cluster creation wizard. Select Servers

At the Validation Warning step (Fig. 27) select Yes and click Next.



Fig. 27 Cluster creation wizard. Validation Warning

This switch starts the configuration validation wizard (Fig. 28).



Fig. 28 Configuration validation wizard. Before you begin

Leave the settings at the following steps unchanged and skip them by clicking **Next**.

After that the configuration will be validated and a report will be generated (Fig. 29). To view the report, click **View Report**. The report contains recommendations on improving the failover cluster.



Fig. 29 Configuration validation wizard. Summary

Take into account the warnings and make the changes according to the recommendations. If there are any errors, eliminate them.

To close the configuration validation wizard and return to the cluster creation wizard (Fig. 30) click **Finish**.

At the **Access Point for Administering the Cluster** step (Fig. 30), enter the cluster name that will be used for administering it, and click **Next**.

	Create Cluster Wizard	X
Access P	oint for Administering the Cluster	
Before You Begin Select Servers Access Point for Administering the	Type the name you want to use when administering the cluster. Cluster Name: srv12db The NatBIOS page is limited to 15 characters. One or more DHCD IIIv/1 addresses were configured.]
Confirmation	Intervetorios name is influence to 15 characters. One of more DRCP 1994 addresses were configured automatically.	
Summary		
	< Previous Next > Cancel	

Fig. 30 Cluster creation wizard. Access Point for Administering the Cluster

In this example, it is **srv12db**. You are going to specify this server name when connecting to the cluster. The name of the availability group listener will be used for connecting to the database. The listener will be created later.

At the **Confirmation** step (Fig. 31), you can review the settings of the new cluster, specified at the previous steps. To continue creating the cluster, click **Next**.

a		Create Cluster Wizard	x
Confirma	tion		
Before You Begin Select Servers	You are ready to create The wizard will create y	e a cluster. your cluster with the following settings:	
Access Point for Administering the Cluster Confirmation Creating New Cluster Summary	Cluster: Node: Node: IP Address:	srv12db srv1-2book.book.local srv2-2book.book.local DHCP address on 192.168.19.0/24	~
	Add all eligible stora	ige to the cluster.	~
	To continue, click Next	-	
		< Previous Next > Ca	ncel

Fig. 31 Cluster creation wizard. Confirmation

Once the installation is complete, the cluster will be created and a report will be generated. The report provides recommendations on improving the cluster's reliability. To view the report, click **View Report**. If there are any errors, you should eliminate them according to the provided recommendations.

To close the cluster creation wizard, click **Finish**.

The created cluster will be added to the Failover Cluster Manager (Fig. 32).

Hailover Cluster Manager	_ D X
File Action View Help	
Failover Cluster Manager Failover Cluster Manager Stri2db.book.local Cluster srv12db.book.local Summary of Cluster srv12db srv12db has 0 clustered roles and 2 nodes. Name: srv12db book.local Name: srv12db book.local Name: srv12db book.local Name: srv12db book.local Networks: Cluster Network 1 Current Host Server: srv1-2book Subnets: 1 IPv4 and 0 IPv6 Recent Cluster Events: None in the last hour Witness: None	 Actions srv12db.book.local Configure Role Validate Cluster View Validation Report Add Node Close Connection
▲ Configure Configure high availability for a specific clustered role, add one or more servers (nodes), or copy roles from a cluster running Windows Server 2012, R2, Windows Server 2012, or Windows Server 2008 R2. Image: Configure Role Image: Failover cluster topics on the Web Image: Validate Cluster Image: Failover cluster topics on the Web Image: Add Node Image: Failover cluster Roles Image: Cluster Roles Image: Cluster Roles	 Reset Recent Events More Actions View Refresh Properties Help
Navigate Roles Ro	×
In the second seco	×

Fig. 32 Failover Cluster Manager

Step 5. Next, you can configure "Services or applications" in the failover cluster. In this case, it is the MS SQL AlwaysOn availability group. It is configured in MS SQL Management Studio.

3.2.3. Creating a shared folder for storing backup copies

For MS SQL AlwaysOn to function correctly, you need to provide all the servers in the cluster with access to backup copies of the databases. Shared access is required because initial synchronization in the MS SQL AlwaysOn availability group in the failover cluster is carried out via a backup copy, available on all the database servers.

We recommend allocating a separate hard drive on the main database server (in this example – 192.168.18.230) for backup copies, create a folder on the hard drive and grant this folder shared access to read and write (in this example, it is the folder **C:\SRV12**). Next, specify this folder as the default folder for creating backup copies.

Step 1. Start MS SQL Server Management Studio (to learn more, see paragraph 3.1.2).

After starting MS SQL Server Management Studio, open the server context menu in the tree and select **Properties** (Fig. 10).

In the opened dialog box, go to the **Database Settings** page and change the location for backup copies in the **Backup** field of the **Database default locations** unit (Fig. 33).

E Server Properties - DEMOCE	310
Select a page	🔄 Script 👻 📑 Help
General	
Processors	Default index fill factor:
Security	
Connections	
Database Settings	Backup and restore
	O <u>W</u> ait indefinitely
	Ity once
	🔿 Try for 🔰 🔂 📩 minute(s)
	Default <u>b</u> ackup media retention (in days):
	0
	Compress backup
	Recovery
	Recovery interval (minutes):
Server:	
DEMOCE310	Database default locations
Connection:	Data: c:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL'
View connection properties	Log: c:\Program Files\Microsoft SQL Server\MSSQL11.MSSQLSERVER\MSSQL
	Backup: C\SBV12
Progress	
Ready	C. Burning values C. Burning values
	Zerngered rakes - Training rakes
	OK Cancel //

Fig. 33 Database Settings. Database default locations

To confirm the settings and close the dialog box, click **OK**.

Attention! It is not recommended to specify a shared folder located on the primary server for a secondary replica, since according to the further settings, a backup copy will be taken from the secondary replica only if the primary server and, therefore, the folder is unavailable.

3.2.4. Creating an MS SQL AlwaysOn availability group

The MS SQL AlwaysOn availability group provides availability of the database in case one or several database servers crush (depends on the total number), and prevents data losses. The availability group is based on the Windows failover cluster component.

Attention! You should apply the procedures described below only to the primary database server.

In this example, it is the server 192.168.18.230.

Place the databases that directly affect the ELMA farm to the availability group:

- ELMA38PROD main ELMA database;
- **ASPState** database for saving sessions;
- **ELMACache** cache cluster configuration database.

An availability group can include only the databases with the full recovery model and only after creating a backup copy (even if a database is new and has no data). That is why first you need to make sure that you have selected the appropriate recovery model and manually create backup copies.

Step 1. Configure each of the abovementioned databases.

In MS SQL Server Management Studio, open the database settings by clicking **Properties** in the context menu (Fig. 34).

Kicrosoft SQL Serv	er Management Studio		_ 🗆 🗵
File Edit View Debu	ug Tools Window Help		
i 🛐 • 🔤 • 💕 📓	🗿 🔛 New Query 🛛 🛅 📸	B (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	- H -
Object Explorer	- ∓ ∓ ×		
Connect 🕶 🛃 📑	🛛 🝸 🌌 🌃		
🖃 🚺 DEMOCE310 (SC	QL Server 11.0.2100 - sa)		
🖃 🧰 Databases	Databases		
E ■ System			
🕀 🧾 ELMAF	New Database		
E Dia Security	New Query		
+ Carter Oc	Script Database as		
🕀 🧰 Managem	Tasks 🕨		
	Policies •		
	Facets		
	Start PowerShell		
	Reports 🕨		
	Rename		
	Delete		
	Refresh		
	Properties		
Ready			lii

Fig. 34 MS SQL Server Management Studio. Database context menu. Properties item

In the opened dialog box, go to the **Options** page and make sure that **Full** is selected in the **Recovery model** field (Fig. 35).

📋 Database Properties - aspn	etdb		_ 🗆 ×
	Script - 🖪 Help		
📑 General			
Files	<u>C</u> ollation:	SQL_Latin1_General_CP1_CI_AS	v
Priegroups Options	Recovery <u>m</u> odel:	Full	
Change Tracking	Compatibility Jevel:	SQL Server 2012 (110)	–
Extended Properties	Containment type:	None	•
	Other options:		
	₹.		
	Auto Create Statistics	True	*
	Auto Shrink	False	
	Auto Update Statistics	True	
	Auto Update Statistics Asynchro	nously False	
	Containment		
		1033	
		English	
	Nested Triggers Enabled	True	
		False	
		2049	
	🗆 Cursor		
	Close Cursor on Commit Enabled	False	
Server:	Default Cursor	GLOBAL	
DEMOCESTO	FILESTREAM		
Connection:	FILESTREAM Directory Name		
sa	FILESTREAM Non-Transacted	Access Off	
I View connection properties	Miscellaneous		
	Allow Snapshot Isolation	False	
Promotor	ANSI NULL Default	False	v
Progress Do Boody	Allow Snapshot Isolation		
neady			
		UK.	Lancel

Fig. 35 Database properties. Options page. Recovery model field

Step 2. Create a backup copy of the database.

In the database context menu, select **Tasks – Back Up...** (Fig. 36).



Fig. 36 MS SQL Server Management Studio. Database context menu. Tasks - Back Up...

In the opened dialog box, go to the **General** page, make sure, that **Full** is selected in the **Backup type** field and specify a location in **Back up to** field (Fig. 37). The copy must be created in the shared folder for backup copies that was created earlier.

📋 Back Up Database - aspnet	db			_ 🗆 🗵
Select a page	🔄 Script 👻 📑 Help			
General				
	Source			
	Da <u>t</u> abase:		aspnetdb	v
	Recovery <u>m</u> odel:		FULL	
	Bac <u>k</u> up type:		Full	•
	Copy-only Backup			
	Backup component:			
	O Database			
	C Files and filegroups:			
	Backup set			
	<u>N</u> ame:	aspnetdb-Full	I Database Backup	
	Description:			
	Backup set will expire:			
	 After: 		🕂 days	
	C <u>O</u> n:		~	
Server:	Destination	G NH	C	
DEMUCESIU	Back up to:	Ujsk 🗸	€ Tage	
sa	C:\SHV12\asphetdb.bak			A <u>d</u> d
View connection properties				Bemove
	· ·			<u>C</u> ontents
Ready				
			OK	Cancel

Fig. 37 Back Up Database dialog box

You should repeat these operations (steps 1 and 2) for all the databases.

Step 3. Create an availability group.

In MS SQL Server Management Studio, open the context menu of **AlwaysOn High Availability** and select **New Availability Group Wizard**... (Fig. 38).

		Microsoft SQL
File Edit View Debug Tools Wind		
🕴 🛅 👻 🖅 🗁 🔛 🥥 🛄 🄔 New Quen	y 🗅 😘 😘 🏠 X 🗣 🕮 1	
Object Explorer	▼ ₽ ×	
Connect 🕶 🛃 🕎 🔳 🍸 🛃 😹		
ELMASQLFC (SQL Server 12.0.2000 Databases Databases Databases Databases Snapshots Database Snapshots Database Snapshots Database Snapshots ELMASQLFC (SQL Server 12.0.2000 Databases Databas) - 53)	
AlwaysOn High Availabili Management	New Availability Group Wizard	
Integration Services Catal	Show Dashboard	
🗄 🔀 SQL Server Agent	Reports	•
	Refresh	

Fig. 38 MS SQL Server Management Studio. AlwaysOn High Availability context menu

Skip the first step by clicking **Next**.

At the **Specify Name** step, enter a name for the new availability group (Fig. 39) and click **Next**. The availability group name is not used for connecting to the database and is not specified in any ELMA configuration files; therefore, you can enter any name you like.

40	New Availability Group	_ [-	x
Specify Availabi	lity Group Name			
Introduction			0	Help
Specify Name	Specify an availability group name.			
Select Databases	Availability group name:			
Specify Replicas	ELMABOOK		_	
Select Data Synchronization				
Validation				
Summary				
Results				
	< Previous Next >	С	ance	:1

Fig. 39 New Availability Group wizard. Specify Name step

To go to the next step, click **Next**.

At the next step, **Select Databases** (Fig. 40), select the databases created earlier:

- ASPState
- ElmaCache
- ELMAPROD38

If you cannot select all the necessary databases now, you can do it later.

ñ		New Av	vailability Group		- D X
Select Database	S				
Introduction					🙆 Help
Specify Name	Select user databases fo	or the availability o	jroup.		
Select Databases	User databases on this in	stance of SQL Serve	er:		
Specify Replicas	Name	Size	Status		
Select Data Synchronization	✓ ASPState	4.0 MB	Meets prerequisites		
Validation	ELMA3PROD	4.0 MB	Meets prerequisites		
Commence	ELMACache	4.0 MB	Meets prerequisites		
Summary					
Results					
					Refresh
				< Previous Next >	Cancel

Fig. 40 New Availability Group wizard. Select Databases

You can add databases to the availability group only if the **State** column displays "Meets prerequisites". If the State column displays Full backup is required, you need to create a backup copy of this database.

To go to the next step, click **Next**.

At the **Specify Replicas** step, on the **Replicas** tab, click **Add Replica**... and specify the information for connecting to the second server in the opened window. Click **Connect**. The selected server will be added to the list of availability replicas on the **Replicas** tab (Fig. 41).

ñ.		New Av	ailability Group)		- 🗆 X
Specify Replicas						
Introduction						🕜 Help
Specify Name	Specify an instance of s	SQL Server to	host a secondary i	replica.		
Select Databases	Replicas Endpoints	Backup Prefere	nces Listener			
Specify Replicas	Availability Replicas:					
Select Data Synchronization	Server Instance	Initial Role	Automatic Failover (Up to 2)	Synchronous Commit (Up to	Readable Secondary	
Summary	SRV1-2BOOK	Primary	-, •	- <i>i</i>	No	v
Results	SRV2-2BOOK	Secondary	✓	✓	No	~
	Add Replica Summary for the repli Replica mode: Synchr This replica will use synch Readable secondary In the secondary role, this	Add Azure Re ica hosted by onous commit w ironous-commit : No s availability repli	plica Remo SRV2-2BOOK ith automatic failover availability mode and ca will not allow any o	ve Replica support both automat	ic failover and manual failover.	Cancel

Fig. 41 New Availability Group wizard. Specify Replicas. Replicas tab

On this tab, you also should check the boxes in the columns **Automatic Failover (Up to 2)** and **Synchronous Commit (Up to 3)**.

Attention! Sometimes the synchronous commit mode slows down the system. It is caused by the network connection settings. Because of this, asynchronous mode was selected for the secondary replica (see paragraph 6.10).

At the **Specify Replicas** step, open the **Backup Preferences** tab and select "Primary" (Fig. 42).

ň.	New A	vailability Group			x
Specify Replicas					
Introduction					🕢 Help
Specify Name	Specify an instance of SQL Server to h	ost a secondary replica.			
Select Databases	Replicas Endpoints Backup Preferen	ces Listener			
Specify Replicas	Where should backups occur?	ļI			
Select Data Synchronization	O Prefer Secondary				
Validation	Automated backups for this availabil there is no secondary replica availabl	ity group should occur on a seco e. backups will be performed on	ndary replica. If the primary replica.		
Summary		-,			
Results	All automated backups for this availa	ibility group must occur on a sec	ondary replica.		
	 Primary All automated backups for this availa replica. Any Replica Backups can occur on any replica in replica backup priorities: 	ibility group must occur on the c the availability group.	urrent primary		
	Server Instance 👻	Backup Priority	Exclude		
	SRV2-2BOOK	50			
	SRV1-2BOOK	50 🗘			
	L				
			< Previ	ous Next > Ca	ancel

Fig. 42 New Availability Group wizard. Specify Replicas. Backup Preferences

The reason behind this choice is that depending on the reading availability settings of the secondary replica, it may be impossible to take backup copies from the secondary replica.

This option does not affect the general performance of the system since it is recommended to make backup copy and perform other maintenance outside the working hours (see the paragraph 5.1).

To go to the next step, click **Next**.

At the **Select Data Synchronization** step, select **Full** and select a network folder, accessible to all the replicas (Fig. 43). By default, this field contains the available network folder for backup copies on the 192.168.18.230 server, which was configured earlier.



Fig. 43 New Availability Group wizard. Select Data Synchronization

To go to the next step, click **Next**.

At the **Validation** step (Fig. 44), the availability group will be validated.

- ñ	New Availability Group	D X
Validation		
Introduction		🕜 Help
Specify Name	Results of availability group validation.	
Select Databases	Name	Result
Specify Replicas	Checking whether the endpoint is encrypted using a compatible algorithm	Success
Calant Data Construction	Checking shared network location	Success
Select Data Synchronization	Checking for free disk space on the server instance that hosts secondary replica SRV2-2BOOK	Success
Validation	Checking if the selected databases already exist on the server instance that hosts secondary replica SRV2-2BOOK	Success
Summary	Checking for compatibility of the database file locations on the server instance that hosts secondary replica SR	Success
Results	Checking for the existence of the database files on the server instance that hosts secondary replica SRV2-2BOOK	Success
	⚠️ Checking the listener configuration	Warning
	Checking the availability mode compatibility between the primary and secondary replicas	Success
	Re-run	Validation
	< Previous Next >	Cancel

Fig. 44 New Availability Group wizard. Validation

To go to the next step, click **Next**.

At the **Summary** step, you can review the full list of parameters, selected at the previous steps of the wizard. To continue creating the availability group, click **Finish**.

The creation process may take a while; wait until it is complete. If any errors occur, follow the recommendations provided in the paragraph 6.8.

3.2.5. Adding databases to the availability group

Attention! You need to follow through this paragraph only if databases were not added to the availability group upon its creation.

If you have failed to add a database to the availability group when creating the MS SQL AlwaysOn group (see paragraph 3.2.4), you can do it at any moment later.

This paragraph repeats some of the steps mentioned <u>above</u>, since adding a database when creating the MS SQL AlwaysOn availability group is not significantly different from adding a database to an existing availability group.

In MS SQL Server Management Studio, open the context menu of **AlwaysOn High Availability – Availability Groups – <...> (Primary) – Availability Databases** click **Add Database...** (Fig. 45). The wizard for adding a database to the availability group will open.



Fig. 45 MS SQL Server Management Studio. Availability Database context menu

Skip the first step of the wizard by clicking **Next**.

At the **Select Databases** step, select the database created earlier and click **Next**.

At the **Select Data Synchronization** step, select **Full** and specify the network folder, accessible for all replicas. To go to the next step, click **Next**.

At the **Connect to Replicas** step, click **Connect** (next to the required replica) and in the opened dialog box select **Windows authentication** in the **Authentication** field. Click **Connect**. The server instance will be connected to the replica. To go to the next step click **Next**.

At the next step, the availability group will be validated. To go to the next step, click **Next**.

At the **Summary** step, all the parameters, selected at the previous steps of the wizard will be displayed. To continue adding databases to the availability group, click **Finish**. The process of creating the availability group may take a while; wait until it is complete.

3.2.6. Creating a database listener in the availability group

Now, server fail-safety is already implemented via MS FailoverCluster, however, such a cluster is not resistant to MS SQL Server failures. To provide higher failover protection and reduce the time for switching between replicas in case of a service or server failure, it is recommended that you create an availability group listener.

Attention! The account you intend to use to perform these actions must have permissions to create computers in the domain.

In MS SQL Management Studio, select your availability group – **Availability Group Listeners – Add Listener...** (Fig. 46).



Fig. 46 MS SQL Management Studio. Availability Group Listeners context menu

In the opened dialog box (Fig. 47), fill in the following fields:

- Listener DNS Name name, used for connecting to databases. In this case, it is SRV.
- **Port** connection port. By default **1433**.
- Network Mode and Subnet the default value is DHCP; upon creation, an attempt will be made to automatically obtain an IP address and link the domain name to it.

<u>.</u>	New A	wailability Group Listener	-		x
Select a page Providential Selection of the selection of	🔄 Script 🔻 🛐 Help	,			
	Listener DNS Name: Port: Network Mode: Choose a Subnet:	SQLELMA 1433 DHCP 192.168.19.0/24			
Connection					
Server: SRV1-2BOOK Connection: BOOK\bookadmin					
View connection properties					
Progress					
Ready					
		ОК		Cance	

Fig. 47 New availability group listener dialog box

To finish registering the listener, click **OK**. If no errors occurred in the process, you can proceed to the next step (see below).

If an error occurred when registering the listener, try changing the **Network Mode** from **DHCP** to **Static** and manually specify an unoccupied IP address.

Chapter 4. Installing and Configuring MS Web Farm Framework

This step provides step-by-step instructions for installing and configuring an ELMA servers web farm.

A web farm allows distributing the load (activity of ELMA users) between several servers (virtual and physical), that work as a single whole. This way, you can significantly increase the number of users working in the system simultaneously.

4.1. Prerequisites

This section describes the requirements for deploying a web farm.

A web farm consists of two application servers and a controller server (loadbalancer), which distributes the load between them:

- 93.158.134.3 SRV12-1
- 213.180.204.3 SRV12-2

Farm controller server:

• 93.158.134.30 - WFCONTROLLER

Prerequisites:

- disable Windows Firewall;
- disable monitors/real-time of anti-virus software;
- install and configure the IIS component as described in paragraph 4.2;
- install and configure the database server.

Some of the installation steps will temporary require:

- Internet access direct or via a proxy server.
- enabled Windows automatic update at least to "Check for update, but let me choose whether to download and install them". Actual Internet access and installation of updates is not required.

Install the following applications and components, which are not included in the standard Windows OS:

• App Fabric 1.1 <u>http://www.microsoft.com/en-</u> us/download/details.aspx?id=27115

- Application Request Routing (ARR) 2.5 http://www.microsoft.com/web/gallery/install.aspx?appid=ARRv2_5
- WPI launcher (requires Internet connection) http://www.microsoft.com/WEB/downloads/platform.aspx
- Web Farm Framework (installed from WPI launcher)
- URL Redirect (installed from WPI launcher)

4.2. Installing and configuring IIS

Attention! You need to apply the steps described below to each application server and to the controller.

You need to install the IIS component before installing ELMA. If IIS is configured correctly, ELMA will function properly.

4.2.1. Installing IIS

 Open the Server Manager (Start -> Server Manager), go to Dashboard, click Manage and select Add Roles and Features (Fig. 21). The Add Roles and Features wizard will open (Fig. 48).

A	Add Roles and Features Wizard
Before you begin	DESTINATION SERVER No servers are selected.
Before You Begin Installation Type Server Selection	This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website.
Server Roles	To remove roles, role services, or features: Start the Remove Roles and Features Wizard
Features Confirmation Results	 Before you continue, verify that the following tasks have been completed: The Administrator account has a strong password Network settings, such as static IP addresses, are configured The most current security updates from Windows Update are installed If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again. To continue, click Next.
	Skip this page by default
	< Previous Next > Install Cancel

Fig. 48 Add Roles and Features wizard. Before you Begin

Skip the first step (Fig. 48) by clicking **Next**.

2. At the **Installation Type** step, select **Role-based or feature-based installation** (Fig. 49) and click **Next**.



Fig. 49 Add Roles and Features wizard. Installation type

3. At the **Server Selection** step, choose **Select a server from the server pool** (Fig. 50) and select the required server. To continue installation, click **Next**.

Coloct doctination				
Select destination	n server			DESTINATION SERVER srv1-2book.book.local
Before You Begin	Select a server or a virtual	hard disk on which t	o install roles and features.	
Installation Type	Select a server from the	e server pool		
Server Selection	O Select a virtual hard dis	sk		
Server Roles	Server Pool			
Features				
Confirmation	Filter:			
Results	Name	IP Address	Operating System	
	srv1-2book.book.local	169.254.1.224,	Microsoft Windows Server 2012 R2	2 Standard
	srv2-2book.book.local	169.254.2.172,	Microsoft Windows Server 2012 R2	2 Standard
	2 Computer(s) found This page shows servers th	at are running Wind	lows Server 2012, and that have beer	n added by using the
	Add Servers command in S collection is still incomplet	Gerver Manager. Offl e are not shown.	ine servers and newly-added servers	from which data
		< Prev	rious Next > Insta	Cancel

Fig. 50 Add Roles and Features wizard. Server Selection

4. At the Server Roles step, check Web Server (IIS) (Fig. 51) and click Next.



Fig. 51 Add Roles and Features wizard. Server Roles

- 5. Skip the **Features** and **Web Server Role (IIS)** steps by clicking **Next**.
- 6. At the **Role Services** step (Fig. 52), select the following role services, installed for IIS.

L	Add Roles and Features Wizard	_ D X
Select role service Before You Begin	S Select the role services to install for Web Server (IIS)	DESTINATION SERVER srv1-2book.book.local
Installation Type Server Selection Server Roles Features Web Server Role (IIS) Role Services Confirmation Results	Role services Windows Authentication Application Development NET Extensibility 3.5 Application Initialization ASP ASP.NET 3.5 ASP.NET 4.5 CGI SAP Extensions SISAPI Filters WebSocket Protocol FTP Server	Description Application Development provides infrastructure for developing and hosting Web applications. Use these features to create Web content or extend the functionality of IIS. These technologies typically provide a way to perform dynamic operations that result in the creation of HTML output, which IIS then sends to fulfill client requests.
	< Previous Net	xt > Install Cancel

Fig. 52 Add Roles wizard. Role Services

Select the following components (Fig. 53):



Fig. 53 Components to install

After selecting all the required components, click Next.

7. At the **Confirmation** step (Fig. 54), you can review role settings, role services and features, selected at the previous steps. To start the installation process, click **Install**.



Fig. 54 Add roles wizard. Confirmation

Close the wizard after the installation is completed.

4.2.2. Configuring IIS

To configure IIS:

1. Start the Internet Information Services (IIS) Manager (Start -> IIS Manager) and click on the Authentication icon in the IIS block (Fig. 55).

Internet Information Services (IIS) Manager	
€ 6 \$\$ \$	📅 🖂 🟠 🕡 🗸
File View Help	
File: View: Help Construction: Construction: Construction: Start Page: Start Page: Construction: Construction: Start Page: Start Page: Construction: Construction: Construction: Start Page: Start Page: Construction: Cons	Actions Open Feature Manage Server Restant Start Start Start Start Restant Start Start Start Change. NET Framework Version Get New Web Platform Components Help
Ready	• <u>a</u> .:

Fig. 55 IIS Manager. Authentication icon

2. In the opened window, select **Anonymous Authentication** and click **Edit...** in the actions menu on the right (Fig. 56).

9	Internet Informati	on Services (IIS)	Manager	_ _ ×
€ SRV1-2BOOK →				🔯 🗵 🟠 10 -
File View Help				
File View Help Connections Start Page SRV1-2BOOK (BOOK\bookadmin) Application Pools Sites	Authentication Group by: No Grouping • Name • Anonymous Authentication ASP.NET Impersonation Basic Authentication Forms Authentication	Status Enabled Disabled Disabled	Response Type HTTP 401 Challenge HTTP 302 Login/Redirect	Actions Help
Configuration: 'localhost' root web.config	En reatures view Content View			9.:

Fig. 56 IIS Manager. Authentication section

In the opened dialog box, select **Application Pool Identity** (Fig. 57).

Edit Anonymous Authentication Credential	s ? X
Anonymous user identity:	
○ Specific user:	
IUSR	Set
 Application pool identity 	
ОК	Cancel

Fig. 57 IIS Manager. Edit Anonymous Authentication Credentials

If you skip this step, ELMA may open pages without static content (images, styles).

Attention! Steps 3 – 6 (marked with [*]) are optional, but if you intend to employ ELMA web farm, it is recommended that you perform them immediately.

3. [*] Additionally, to establish remote management from one server machine, go to the **Management Service** in the IIS Manager (Fig. 58).



Fig. 58 IIS Manager. Management Service icon

If you do not have this menu item, then the **Management Service** component is not installed. Install this component and restart the IIS Manager.

4. **[*]** Ignore the warnings in the upper right corner (Fig. 59); they specify the correct order of actions and the mentioned stopping and restarting refers to this service, not the ELMA system/server/pool.

8	Internet Information Services (IIS) Manager	_ D X
€ SRV1-2BOOK ►		😉 🗠 🕜 💌 🕶
File View Help		
File View Help Connections Sector 2000 (BOOK,bookadmin) SRV1-2BOOK (BOOK,bookadmin)	Management Service Use this feature to configure how clients connect to this server by using remote connections in IIS Inable remote connections Identity Credentials Windows credentials only Windows credentials or IIS Manager credentials Connections IP address: Port: All Unassigned SSL certificate: WMSVC V to grequests to: %SystemDrive%\Inetpub\logs\WMSvc Enable failed request tracing IP Address Restrictions Access for unspecified clients: Allow Mode Requestor Allow Delete	Alerts The Management Service (WMSVC) is stopped. The service must be started to server by using IIS Manager. Actions Actions Cancel Cance
	Features View 💦 Content View	
Ready		€ <u>1.</u> :

Fig. 59 IIS Manager. Management Service section

- 5. [*] Stop the service using the **Stop** button in the right part of the window.
- 6. [*] Check the **Enable Remote Connectors** box and start the server by clicking **Start** in the right part of the window (Fig. 60). The other settings are required for fine-tuning; you can skip them.

V	Internet Information Services (IIS) Manager	_ _ ×
€ SRV1-2BOOK ►		😂 🖂 🔞 •
File View Help		
Connections	Wanagement Service Use this feature to configure how clients connect to this server by using remote connections in IIS Image: Image:	Alerts The Management Service (WMSVC) is stopped. The server by using IIS Manager. Actions
Ready		€ <u>∃</u> .:

Fig. 60 IIS Manager. Management Service section

Now, everything is ready for installing ELMA.

In addition, it is recommended that you disable logging in IIS (see section 4.6).

Configuring IIS to work with ELMA is similar in other editions of Windows Server.

4.3. Installing and Configuring Farm Servers.

Attention! You should apply the steps described below to all the database servers.

4.3.1. Installing ELMA

Before you start using ELMA, you must install and register it. To install the system, use the installation software that you can get from an ELMA Company representative. You can find more information about installing and registering ELMA in <u>ELMA BPM Platform user manual</u>, and in <u>Help</u>.

This subsection partially describes the ELMA installation process. The description includes only the steps you need to pay attention to when installing ELMA Enterprise.

Step 1. ELMA Enterprise must be installed with a new configuration, using the MS SQL Server database (Fig. 61).

🗘 Setup - ELMA 3.8 Enterprise	
Selecting Configuration Select ELMA configuration to use	Ð
	Puesuan 1
	browse,
New configuration	
Lonfiguration folder	
C:\ELMA3-Enterprise\UserConfig	Browse
Database type	
O Firebird	
O Microsoft SQL Server	
• Oracle	
© ELMA 2006-2016 <u>http://www.elma-bpm.com</u> < <u>B</u> ack <u>N</u> ext >	Cancel

Fig. 61 Installing ELMA

Step 2. ELMA must be installed on the IIS Server. You need to set the following parameters for the system to work correctly (Fig. 62):

🗘 Setup — ELMA 3.10 Enterprise	_ 🗆 🗙
Configure Web Server Configure the server to run ELMA 3.10 web application	D
Website Port	80
The sele	ected port must NOT be used by another application
The port is used in the URL bar. For example, if you install look like this: http	ELMA server on port 8000, then the URL in the browser will o://localhost:8000
C IIS Server	C Internal ELMA Server
Website Name	ELMA3-Enterprise
Application pool identity	User 💌
User name ELEWISE\ELMAAdmin	Password •••••
© ELMA 2006-2017 <u>http://www.elma-bpm.com</u> ,	< Back Next > Cancel

Fig. 62 Installing ELMA

Website Port must be set to 80. If the 80 port is occupied, go to the IIS Manager (**Start ->IIS Manager**) and in the **Sites** branch stop the Default website (by default, it occupies the 80 port). ELMA can use any unoccupied port, however, it is more convenient for users to open ELMA via the 80 port, since it is the default website port and users do not need to type it in the URL bar manually.

Website Name – ELMA3-Enterprise.

Web applications pool – ELMA3-Enterprise.

Application pool identity – from the drop-down list select **User** and enter their login – EleWise\ELMAAdmin – and password.

This account must have administrator permissions on the current server.

Step 3. After installing ELMA on the webserver, it is better not to start servers. On each virtual machine, stop the ELMA3-Enterprise pool and site, since you need to configure server pools and configuration files.

To do so, start the IIS manager, open **Application Pools**, right click on **ELMA3-Enterprise** (matches the name, specified during the installation) and select **Advanced Settings**... in the context menu (Fig. 63).

📬 Internet Information Services (IIS) M	lanager									
COC I DEMOCE310 > Appli	cation Pools							🖸 🖸 🖾 🔂 🛛 🕶		
File View Help										
Connections Application Pools								Actions		
Start Dana								Add Application Pool		
DEMOCE310 (DEMOCE31	lets you view	and manage	the list of applications	ation pools on the se and provide isolation	erver. Application pools ar	e associated with iops	-	Set Application Pool Deraults		
Application Pools	0003303, 00100		N co. – 🖵 shor	u áll L Creurs bur 🔹	In Conversion	-		Application Pool Tasks		
Piter:		Statuc	NET Frame	Managed Pineli	Identity	Applications		Stop		
ASP.I	VET v4.0	Started	v4.0	Integrated	ApplicationPoolIden	0	2	Recycle		
asp.1	VET v4.0 Cl	Started	v4.0	Classic	ApplicationPoolIden	0	<u> </u>	Edit Application Pool		
Lass Defai	it App	Started	v4.0 v4.0	Classic	ApplicationPoolIden	2		Basic Settings		
	3-CE	Started	v4.0	Integrated	LocalSystem	1		Recycling		
ELM4	3-Enternrise	Started	v4 0	Integrated	ApplicationPoolIden	1		Advanced Settings		
4	👌 Add Appl	ication Pool.						Rename		
	Set Appli	cation Pool D	efaults				×	Remove		
	Start							View Applications		
	Stop						0	Help		
	Recycle							Online Help		
	Basic Set	tings								
	Recycling	J								
	Advance	d Settings								
	Rename									
	K Remove									
	View App	lications								
	Help									
1	Online He	elp								
							1			
Feature	es View	ontent View								
Ready								• 1 .:		

Fig. 63 IIS Manager. Pool context menu

The Advanced Settings dialog box will open (Fig. 64).

In **Idle Time-out (minutes)**, specify "0". The default value is "20" (minutes). It means that the application pool will sleep if it does not receive web requests for 20 minutes. The "0" value disables this feature.

In **Regular Time Interval (minutes)**, specify "0".

In **Disable Recycling for Configuration Changes**, select "True". It is necessary to avoid delays and errors that occur in case of a time-out or unexpected restart, since all the HTTP requests and responses go through the application requests routing system.

	Limit Action	NoAction
	Limit Interval (minutes)	5
	Processor Affinity Enabled	False
	Processor Affinity Mask	4294967295
Ξ	Process Model	
	Identity	ApplicationPoolIdentity
	Idle Time-out (minutes)	0
	Load User Profile	False
	Maximum Worker Processes	1
	Ping Enabled	True
	Ping Maximum Response Time (second	90
	Ping Period (seconds)	30
	Shutdown Time Limit (seconds)	90
	Startup Time Limit (seconds)	90
Ξ	Process Orphaning	
	Enabled	False
	Executable	
	Executable Parameters	
-	Rapid-Fail Protection	
	"Service Unavailable" Response Type	HttpLevel
	Enabled	True
	Failure Interval (minutes)	5
	Maximum Failures	5

Fig. 64 IIS Manager. Advanced Settings dialog box

To apply the changes you have made, click **OK**.

Step 4. Next, you need to create a shared network folder for storing ELMA configuration. In this example, the folder will be created on the server 93.158.134.35 – ELMAConfig.

On ELMAConfig, allocate a separate hard drive with at least 500 GB for storing files. In this example, it will be disk E. Create a folder and name it **ELMAShared**.

Configure sharing for this folder. Open the context menu of the **ELMAShared** folder and select **Properties**. A dialog box will open, where you need to select the **Share** tab and click **Share**... (Fig. 65).
📙 ELMAShared Properties 🛛 🗙
General Sharing Security Previous Versions Customize
Network File and Folder Sharing ELMAShared
Not Shared
Network Path: Not Shared
<u>Share</u>
Advanced Sharing
Set custom permissions, create multiple shares, and set other advanced sharing options.
😵 Advanced Sharing
Password Protection
People must have a user account and password for this computer to access shared folders.
To change this setting, use the <u>Network and Sharing Center</u> .
OK Cancel Apply

Fig. 65 Folder properties dialog box

In the opened dialog box (Fig. 66), add the account, which will run the services (ELMAAdmin), and assign permissions to **Read/Write**.

File Sharing	
🕽 🔉 File Sharing	
Choose people to share with	
Type a name and then click Add, or click the arro	ow to find someone.
	✓ Add
Name	Permission Level
ELEWISE\ELMAAdmin	Read/Write 🔻
I I'm baving trouble sharing	
the restrict of the second sec	
	Others 1 and
	Share Cancel

Fig. 66 Configuring shared access

To save the changes, click **Share -> Done**.

Step 5. Proceed to creating configuration files. To do so, open the ELMA configuration file (**configuration.config**) on any of the application servers. In this example, it is 93.158.134.3. You can find the configuration.config file in **C:\ELMA3-Enterprise\UserConfig**.

To the **configuration.config** file, add the following:

Also, add the database location:

<connectionStrings>

```
<add name="MainDB" connectionString="Data Source=SRV12DBLst;Initial
Catalog= ELMAProd38;User ID=sa;Password=123456;"/>
```

</connectionStrings>

Note that **<connectionString>** contains the string for connecting to the database on the database server. In this case, it is:

- server srv12 (database cluster connection point name);
- database ELMAProd38;
- log in using the **sa** account with the password **123456**.

In the string:

<fileStore defaultProvider="FSProvider">

<providers>

<clear/>

```
<add name="FSProvider"
type="EleWise.ELMA.Runtime.Providers.Impl.FileSystemFileStoreProvider,
EleWise.ELMA.SDK" filesPath="\\ ELMAConfig\ELMAShared\Config\Files"
tempFilesPath="\\ ELMAConfig\ELMAShared\Config\TempFiles"/>
```

</providers>

</fileStore>

Specify the location of the network folder for storing files and temporary files.

In this example, it is the shared folder \\ELMAConfig\ELMAShared\

Next, copy and paste this code to the file:

<cacheService defaultProvider="AppFabric">

<providers>

<clear/>

name="AppFabric"

<add name=
type="EleWise.ELMA.Cache.AppFabric.AppFabricCacheService,
EleWise.ELMA.Cache.AppFabric"/>

</providers>

</cacheService>

<AppFabricProviderSettings channelOpenTimeout="20000"
requestTimeout="10000" dataCacheServiceAccountType="DomainAccount"
MainCacheName="ELMACache" NHCacheName="ELMACache_NH" LockTimeout="30000"
LocksRegionName="ELMACache_NH Locks">

<hosts>

```
<host name="127.0.0.1" cachePort="22233"/>
```

</hosts>

</AppFabricProviderSettings>

Note that such values as ELMACache; ELMACache _NH; ELMACache _NH_Locks; 22233 are taken from the **AppFabricCacheService** settings, which are described below.

Attention! If you specified different names or port when configuring the cache, you should use those in the file.

Do not change **host name="127.0.0.1"** in any case. Since one configuration file is used for several servers, the host address must refer to the local cache instance, i.e. 127.0.0.1 or localhost. Changing this address in the configuration file to a specific network address or a domain name will cause each server to store its cache in that address, instead of storing it locally.

Step 6. Save and move all the content of the folder C:\ELMA3-Enterprise\UserConfig\tothefolder\\ELMAConfig\ELMAShared\Config.Thus, you will create a copy of all theconfigurations in the folder, accessible to all the application servers.

The resulting configuration file should look like this:

<?xml version="1.0"?>
<configuration>
 <configSections>

<section name="cacheService"
type="EleWise.ELMA.Configuration.GenericProviderFeatureSection`1[[EleWis
e.ELMA.Cache.CacheServiceManager, EleWise.ELMA.SDK]], EleWise.ELMA.SDK"
/>

<section name="AppFabricProviderSettings"
type="EleWise.ELMA.Cache.AppFabric.AppFabricProviderSettings,
EleWise.ELMA.Cache.AppFabric"/>

<section name="main"
type="EleWise.ELMA.Configuration.MainBaseSettingsSection,
EleWise.ELMA.SDK"/>

<section name="blobStore"
type="EleWise.ELMA.Configuration.GenericProviderFeatureSection`1[[EleWis
e.ELMA.Runtime.Providers.BLOBStoreProviderManager, EleWise.ELMA.SDK]],
EleWise.ELMA.SDK"/>

<section name="settingsStore"
type="EleWise.ELMA.Configuration.GenericProviderFeatureSection`1[[EleWis
e.ELMA.Runtime.Providers.SettingsStoreProviderManager,
EleWise.ELMA.SDK]], EleWise.ELMA.SDK"/>

<section name="fileStore"
type="EleWise.ELMA.Configuration.GenericProviderFeatureSection`1[[EleWis
e.ELMA.Runtime.Providers.FileStoreProviderManager, EleWise.ELMA.SDK]],
EleWise.ELMA.SDK"/>

</configSections>

<connectionStrings>

<add name="MainDB" connectionString="Data
Source=SRV12DBLst;Initial Catalog=ELMAPROD38;Integrated Security=false;
User ID = sa; Password=123456"/>

</connectionStrings>

<main

connectionStringName="MainDB" type="EleWise.ELMA.Extensions.MSSQL.MSSQLProvider, EleWise.ELMA.Extensions.MSSQL" backupEnabled="false"/>

<blobStore defaultProvider="MemoryBLOBStoreProvider">

<providers>

<clear/>

<add name="MemoryBLOBStoreProvider" type="EleWise.ELMA.Runtime.Providers.MemoryBLOBStoreProvider, EleWise.ELMA.SDK"/>

</providers>

</blobStore>

<settingsStore defaultProvider="NHSettingsProvider">

<providers>

<clear/>

<add

name="NHSettingsProvider" type="EleWise.ELMA.Runtime.Providers.Impl.NHSettingsStoreProvider,

EleWise.ELMA.SDK"/>

</providers>

</settingsStore>

<fileStore defaultProvider="FSProvider">

<providers>

<clear/>

<add

name="FSProvider" type="EleWise.ELMA.Runtime.Providers.Impl.FileSystemFileStoreProvider, EleWise.ELMA.SDK" filesPath="\\ELMAConfig\ELMAShared\Config\Files" tempFilesPath="\\ELMAConfig\ELMAShared\Config\TempFiles"/>

</providers>

</fileStore>

<cacheService defaultProvider="AppFabric">

<providers>

<clear/>

<add

name="AppFabric"

type="EleWise.ELMA.Cache.AppFabric.AppFabricCacheService, EleWise.ELMA.Cache.AppFabric"/>

</providers>

</cacheService>

channelOpenTimeout="20000" <AppFabricProviderSettings</pre> requestTimeout="10000" dataCacheServiceAccountType="DomainAccount" MainCacheName="ELMACache" NHCacheName="ELMACache NH" LockTimeout="30000" LocksRegionName="ELMACache_NH_Locks">

<hosts>

4.3.2. Switching servers to using a single configuration file

To switch servers to using the same configuration file on each application server, specify the configuration file location in the **connection.config** file in the **C:\ELMA3-Enterprise\Web** folder:

```
<?xml version="1.0"?>
<connectionStrings>
<add name="ConfigurationFile" connectionString="\\
ELMAConfig\ELMAShared\Config\configuration.config"/>
</connectionStrings>
```

In this file you specify, that the configuration located in the shared folder on the server 93.158.134.35 ELMAConfig should be used.

Next, you need to share the **Web** folder, located in **C:\ELMA3-Enterprise\Web**. Later on, it will not be necessary to remotely use or change the content of this folder. However, it will help to gather log files and diagnostics results.

Attention! ELMA3-Enterprise application pools must be disabled, since you have specified that AppFabric cache cluster and ASPState should be used, but have not completed their configuration. If for some reason the application pool was started, then you will most likely see an ELMA server start error. Stop the ELMA3-Enterprise pool and continue configuring.

4.4. Installing and Creating Cache Cluster

This chapter discusses two cache cluster options for a web farm – <u>Redis</u> and <u>AppFabric 1.1.</u> In this guide, we recommend using Redis cache cluster. Note that this cluster can be replaced with its analog AppFabric 1.1.

4.4.1. Installing and creating the Redis cache cluster

This section deals with installing, configuring and creating the Redis cache cluster.

4.4.1.1 Before you start

To work with the Redis cache cluster, you must have the following:

- ELMA 3.9.22, 3.10.12, 3.11.2 or higher;
- At least three Redis cache cluster servers with Unix OS (Linux, OSX, OpenBSD, NetBSD, FreeBSD and derived OS).

After that you can download the latest **Stable** version of Redis from the <u>official website</u>.

4.4.1.2 Building and installing cache cluster

An example of the Redis cache cluster installation on Ubuntu 14/16.

The installation process consists of several steps and is described in the table below. Each step requires a series of commands.

sudo apt-get update	Install additional packages, required for
sudo apt-get install build-essential	assembling a Redis package. In case of Ubuntu, those
sudo ant act install tal? E	are build-essentials and tcl 8.5 (or higher).
sudo apt-get install tcl8.5	
wget	Download the Redis package to any folder (e.g.
http://download.redis.io/releases/redis-	/home/ <user>). (get a URL <u>on the page</u>).</user>
stable.tar.gz	
tar xzf redis-stable.tar.gz	Unzip the package (the name of the
	downloaded package may be different).
cd redis-stable	Open the folder with the unzipped package
	(the name may also be different).
make	Assemble the package.

make test	Check the assembled package.
make install	Install the package and register it for running.
cd utils	./install_server.sh – this command is
./install_server.sh	interactive; when requesting parameters, you can use default values.
	After running these commands, the binary files redis-cli and redis-server will be installed to /usr/local/bin . Additionally, the service with the parameters specified in install_server.sh will be registered.
sudo service redis_6379 start	Start the service. Note that the server name may be different, depending on the values, specified in the install_server.sh command. To stop the service, type 'stop' instead of 'start' .

4.4.1.3 Configuring the Redis cache cluster

You can find links to official Redis documentation below:

- configuring a cluster;
- configuring a high-availability solution.

This guide describes how to configure the simplified variant. The first server is Master, the second and consequent are Slave servers.

Step 1. To configure the Redis cache cluster configuration, you must edit the **/etc/redis/redis.conf** file on each of the servers. To do this, you can use the command line text editor **Nano**. In order to open the configuration file, open the terminal and execute the **nano/<absolute file path>** command (e.g., **nano/etc/redis/redis.conf**). To perform a quick search in **Nano**, use the keyboard shortcut **Ctrl+W**.

In addition, the following commands may be helpful while working in the terminal:

- **Is** display the contents of the current directory;
- **cd** go to your home directory.

#bind 127.0.0.1	Make the server available for all the IP addresses of this server.
	# – comment line, i.e. In this case, it makes the Redis service available for external addresses.

To ensure maximum performance, disable data backup copying to the disk. To do so:

#save	comment out all the lines starting with 'save'
	(e.g. #save 900 1).
appendonly no	Set the value.

Step 2. To configure Master server, execute the following commands:

tcp-keepalive 60	Set the parameter.
requirepass your_redis_password	Set the Master access password.

If necessary, set the used memory limit (upon reaching the threshold, some values will be removed depending on the **maxmemory-policy** strategy, defined in the parameter):

maxmemory <bytes></bytes>	Specify the maximum volume in bytes or leave the line commented.
maxmemory-policy volatile-Iru	Set volatile-Iru or another value, specified in the comments in this file redis.conf .
maxmemory-policy noeviction	Set noeviction if using a limit is not required.

Step 3. To configure the Slave server, you must additionally execute the following commands:

requirepass your_redis_password	Specify the Slave access password (for the	
	correct functioning of ELMA, specify the same password, as for the Master).	
slaveof your_redis_master_ip 6379	Specify the Master address and port.	
masterauth your_redis_password	Specify the Master password.	

Step 4. To complete the configuration, restart all the servers by running the following command:

sudo service redis_6379 restart	Restart all the servers (first M	aster, then
	Slaves).	

4.4.1.4 Configuring Redis servers for failover operation

Attention! Cache Redis.Cluster is not used in ELMA! Use Redis Sentinel instead.

First, Configure Redis Master and several Redis Slave servers (see 4.4 above). Then configure Redis sentinel architecture according to the <u>documentation</u>.

4.4.1.4.1 Configuring Redis Sentinel

If Redis.sentinel is configured and the master server is down, then one of the slave servers will be reconfigured as the master. This decision is made by all the started Redis.sentinel servers, having reached a quorum (the **sentinel monitor** parameter in the configuration). Once the master server is up again, it will be reconfigured as a slave.

Step 1. To configure, create a file **.../etc/redis/redis.sentinel.conf** on each server with the help of the **nano/etc/redis/redis.sentinel.con command:**

```
# *** IMPORTANT ***
#
#
# By default Sentinel will not be reachable from interfaces different
than
# localhost, either use the 'bind' directive to bind to a list of
network
# interfaces, or disable protected mode with "protected-mode no" by
# adding it to this configuration file.
#
# Before doing that MAKE SURE the instance is protected from the outside
# world via firewalling or other means.
#
# For example you may use one of the following:
#
# bind 127.0.0.1 192.168.1.1
protected-mode no
```

Chapter 4

```
# port <sentinel-port>
# The port that this sentinel instance will run on
port 16379
```

By default Redis does not run as a daemon. Use 'yes' if you need it. # Note that Redis will write a pid file in /var/run/redis.pid when daemonized.

daemonize yes

Specify the log file name. Also the empty string can be used to force # Redis to log on the standard output. Note that if you use standard # output for logging but daemonize, logs will be sent to /dev/null logfile /var/log/redis/redis-sentinel.log

```
# sentinel monitor <master-name> <ip> <redis-port> <quorum>
# Tells Sentinel to monitor this master, and to consider it in O DOWN
# (Objectively Down) state only if at least <quorum> sentinels agree.
#
# Note that whatever is the ODOWN quorum, a Sentinel will require to
# be elected by the majority of the known Sentinels in order to
# start a failover, so no failover can be performed in minority.
# Slaves are auto-discovered, so you don't need to specify slaves in
# any way. Sentinel itself will rewrite this configuration file adding
# the slaves using additional configuration options.
# Also note that the configuration file is rewritten when a
# slave is promoted to master.
# Note: master name should not include special characters or spaces.
# The valid charset is A-z 0-9 and the three characters ".- ".
sentinel monitor elma-redis your redis master ip 6379 2
# sentinel auth-pass <master-name> <password>
# Set the password to use to authenticate with the master and slaves.
```

Useful if there is a password set in the Redis instances to monitor. # # Note that the master password is also used for slaves, so it is not # possible to set a different password in masters and slaves instances # if you want to be able to monitor these instances with Sentinel. # However you can have Redis instances without the authentication enabled # mixed with Redis instances requiring the authentication (as long as the # password set is the same for all the instances requiring the password) as the AUTH command will have no effect in Redis instances with authentication # switched off. sentinel auth-pass elma-redis your redis password # sentinel down-after-milliseconds <master-name> <milliseconds> # # Number of milliseconds the master (or any attached slave or sentinel) should # be unreachable (as in, not acceptable reply to PING, continuously, for the # specified period) in order to consider it in S DOWN state (Subjectively # Down). # Default is 30 seconds. sentinel down-after-milliseconds elma-redis 30000 # sentinel failover-timeout <master-name> <milliseconds> # sentinel failover-timeout <master-name> <milliseconds> # # Specifies the failover timeout in milliseconds. It is used in many ways: # # - The time needed to re-start a failover after a previous failover was already tried against the same master by a given Sentinel, is two # times the failover timeout. #

- The time needed for a slave replicating to a wrong master according to a Sentinel current configuration, to be forced to replicate # with the right master, is exactly the failover timeout (counting since # the moment a Sentinel detected the misconfiguration). # # - The time needed to cancel a failover that is already in progress but did not produced any configuration change (SLAVEOF NO ONE yet not # acknowledged by the promoted slave). # # - The maximum time a failover in progress waits for all the slaves to be reconfigured as slaves of the new master. However even after this # time the slaves will be reconfigured by the Sentinels anyway, but not # with # the exact parallel-syncs progression as specified. # # Default is 3 minutes. sentinel failover-timeout elma-redis 180000

Step 2. Fill the Master-server data:

sentinel	monitor	elma-redis	Specify the Master address and port and the
your_redis_master_ip 6379 2		9 2	value for reaching a quorum.
sentinel your_redis_p	auth-pass bassword	elma-redis	Specify a password for accessing the Master.

Step 3. Create a folder **.../var/log/redis/** with the help of the **sudo mkdir/var/log/redis/** command and configure access to it.

Step 4. To complete the configuration of **Redis Sentinel**, run the following command:

protected-mode no	Configure bindings to network interfaces.
-------------------	---

Step 5. Attention! When a sentinel server is operational, configuration files of the server and of each Redis server change, therefore you must grant access to overwriting them. You can use the sudo chmod a+rwx/etc/redis/ command for it.

#!/bin/bash

To configure a sentinel server as a service, create a file **/etc/init.d/redissentinel** on each server and configure access permissions.

```
# Start/Stop/restart script for Redis Sentinel
NAME=`basename ${0}`
EXEC=/usr/bin/redis-server
PIDFILE="/var/run/redis/${NAME}.pid"
CONF="/etc/redis/redis.sentinel.conf"
PID=`cat $PIDFILE 2> /dev/null`
case "$1" in
     start)
         echo "Starting $NAME ..."
         touch $PIDFILE
         exec $EXEC $CONF --sentinel --pidfile $PIDFILE
         ;;
     stop)
         echo "Stopping $NAME ..."
         kill -9 $PID
         ;;
     restart)
         echo "Restarting $NAME ...."
         $0 stop
         sleep 2
         $0 start
         ;;
     *)
         echo "Usage $0 {start|stop|restart}"
         ;;
esac
```

EXEC=/usr/bin/redis-server or **/usr/local/bin/redisserver** (executable redis-server application; you can take it from the file /etc/init.d/redis-server)

Step 6. Create a folder .../var/run/redis, configure access to it.

Step 7. To complete the configuration of **Redis Sentinel**, run the following command:

sudo	systemctl	unmask	redis-	Register the service.
sentinel.service				

Step 8. Start the Sentinel-server on each server:

sudo service redis-sentinel start	Start server.
or sudo redis-server /etc/redis/ redis.sentinel.conf –sentinel	/etc/redis/ redis.sentinel.conf is the path to the required sentinel configuration.

4.4.2. Installing and creating the AppFabric cache cluster

This section deals with installing, configuring and creating the AppFabric 1.1. cache cluster.

4.4.2.1 Before you start

First, download or copy the AppFabric 1.1 installation file from the <u>official</u> <u>site</u>. In case the downloaded file is a web installer, you will need an active internet connection.

Second, enable automatic Windows update at least in the "Check for updates but let me choose whether to download and install them" mode. In this case, the actual access to the Internet and the installation of updates is not required.

4.4.2.2 Installing and creating a cache cluster

Initial installation of AppFabric includes creating a cache cluster and automatic creation of a database for saving a configuration – these operations are performed once on the first application server (in this case, it is 93.158.134.3 – SRV12-1). After that, the other servers join the cluster as described below.

Step 1. Start installation of AppFabric and select all the suggested features.

Attention! If automatic update is not enabled, AppFabric installation will not start. If automatic update is enabled, but the AppFabric installation still displays an error, disable and re-enable the automatic update.

Step 2. After installing AppFabric on the web server, **AppFabric for Windows Server** will appear in **Start -> All Programs**. Select **Configure AppFabric** (Fig. 67), to start the AppFabric Server configuration wizard:



Fig. 67 Start -> All Programs -> AppFabric for Windows Server -> Configure AppFabric

1. At the first step (Fig. 68), you will be offered to participate in the customer experience improvement program. You can refuse to send Microsoft information about any issues and to participate in the program.

To go to the next step, click **Next**.

👫 AppFabric Server Configuration 🕯	Wizard	_ 🗆 X
Before You Begin		
Before You Begin	This wizard helps you configure AppFabric Server.	
Before You Begin Hosting Services Cache Node Application	 This wizard helps you configure AppFabric Server. Depending on the features that are installed, this wizard can help you: Configure the accounts for the Event Collection service and the Workflow Management service. Add the default configuration entries for the monitoring and persistence stores to the root Web.config file. Initialize the default monitoring and persistence stores. Create a new or join an existing cache cluster. This wizard will overwrite existing configuration values with new values provided. For more information, consult: Getting started with AppFabric 1.1 for Windows Server To continue, click Next. Customer Experience Improvement Program Yes, I want to send Microsoft basic information about how I use AppFabric. Read the privacy statement online 	
	Help Canc	el

Fig. 68 AppFabric Server configuration wizard. Before Your Begin

2. At the second step of the wizard (Fig. 69), you need to configure hosting services. Leave all the settings unchanged.

HappFabric Server Configuration	Wizard							
Configure Hosting Se	rvices							
Before You Begin	This page lets you add or update the system-level configuration for the Hosting Services							
Hosting Services	feature.							
Caching Service	Set monitoring configuration							
Cache Node	▲ Monitoring is not configured.							
Application	AppFabric Event Collection service account:							
Application	Monitoring provider							
	(Select a provider)							
	How to install additional monitoring providers							
	Set persistence configuration							
	AnnEabric Workflow Management service account:							
	NT AUTHORITY/LOCAL SERVICE Change							
	Persistence provider:							
	(Select a provider) Configure							
	How to install additional persistence providers							
	Help Cancel							

Fig. 69 AppFabric Server configuration wizard. Hosting Services

3. At the third step of the wizard (Fig. 70), you need to configure caching services. Check the **Set Caching Service configuration** box and specify the parameters.

Specify the **Caching Service account** by clicking **Change**... You must select a domain account with administrator permissions for all the machines. Moreover, this account has to have access to the SQL-server. In this example, it is the EleWise\ELMAadmin account.



Fig. 70 AppFabric Server configuration wizard. Cache Service

In the drop down list of **Caching Service configuration provider** (Fig. 70), select **SQL Server AppFabric Cashing Service Configuration Store Provider** and click **Configure...** next to the provider name.

The dialog box **AppFabric Server Caching Service configuration Store** will open (Fig. 71).

R	AppFabric Server Caching Service configuration Store
i Si Si Wi	pecify settings to create and register an AppFabric Caching Service configuration database th the Microsoft SQL Server Provider.
 ✓ Register / ✓ Create Ap 	AppFabric Caching Service configuration database. IpFabric Caching Service configuration database.
Server:	SRV12-1
Database:	ELMA Cache 🗸
Help	OK Cancel

Fig. 71 AppFabric Server Caching Service configuration Store

In this dialog box (Fig. 71), you need to:

- check the **Create AppFabric Caching Service configuration database** box. It will allow creating a database with a configuration and connect other servers to the cache;
- specify the name of your SQL server (VM name\SQL login) in the Server field. In this example, the VM name is SRV12-1, login – local (it is not specified);
- specify the name of the database for storing cache in the **Database** field. It is not the same database that was created for ELMA3-Enterprise; it is a new database for storing cache settings. In this example, the name ELMACache has also been specified in the configuration file.

To save the changes, click **OK**.

You also need to select **New cluster** at the **Caching Service** step (Fig. 70) and select **Small (1-5 Machines)** in the **Cluster size** field.

4. At the fourth step of the wizard (Fig. 72), you can specify the cache node ports and firewall parameters. Leave all the settings unchanged.

HAppFabric Server Configuration	Nizard
Configure AppFabric	Cache Node
Before You Begin Hosting Services Caching Service Cache Node	This page lets you set the configuration of the Cache node. Node ports Specify unique port numbers between 1024 and 65535. Cache port: 22233
Application	Cluster port: 22234 Arbitration port: 22235 Replication port: 22236 Windows firewall exceptions To configure the AppFabric Caching Service successfully, select each of the following rules and verify with your system administrator that they do not conflict with the settings in your domain. Image: AppFabric Server: AppFabric Caching Service Image: Remote Service Management Help < Previous

Fig. 72 AppFabric Server configuration wizard. Cache Node

5. At the last step of the wizard (Fig. 73), check the **Start Internet Information Services (IIS) Manager** box and click **Finish**. Now you can proceed to connecting the other servers to the cache cluster.

👫 AppFabric Server Configuration V	Wizard	
Configure Application		
Before You Begin Hosting Services Caching Service Cache Node Application	Hosting Services You can make additional configuration settings for the Hosting feature using the IIS modules for AppFabric Server. Start Internet Information Services (IIS) Manager	
	Help Canc	el

Fig. 73 AppFabric Server configuration wizard. Results

4.4.2.3 Connecting the other servers to the AppFabric cache cluster

For you to be able to connect servers, a cluster must already be created (described выше). Cache must be installed and connected on each application server where ELMA will function.

On the server 93.158.134.3 – SRV12-1, cache has been connected during the installation. For the other server (213.180.204.3 – SRV12-2), you need to apply all the steps, described in this section.

Step 1. Start installation of AppFabric using the same installation file, as in section 4.4.1.3, and select all the features.

Attention! If automatic update is not enabled, AppFabric installation will not start. If automatic update is enabled, but the AppFabric

installation still displays an error, disable and re-enable the automatic update.

Step 2. After installing AppFabric on the web server, **AppFabric for Windows Server** will appear in **Start -> All Programs**. Open it, and select **Configure AppFabric** (Fig. 67), to start the AppFabric Server configuration wizard:

The first two steps are described in the section 4.4.1.3.

At the third step of the wizard (Fig. 74), you need to configure the caching service. Check the **Set Caching Service configuration** box and specify the following parameters:

🕌 AppFabric Server Configuration	Wizard 📃 🖾 🗶					
Configure Caching Se	rvice					
Before You Begin	This page lets you set the system-level configuration for the Caching Service.					
Hosting Services	Set Caching Service configuration					
Caching Service	⚠ This machine is not a member of an AppFabric Caching cluster.					
Cache Node						
Application	Caching Service configuration provider:					
	SQL Server AppFabric Caching Service Configuration Store Provider 🗾 Configure					
	How to install additional providers					
	File share (UNC server share required: \\server\share):					
	The High Availability feature of AppFabric Server caching features requires all nodes in the cache cluster to be running Windows Server Enterprise Edition or higher. Please confirm that all High Availability cache nodes are running on a supported operating system. More information about High Availability					
	• New cluster • Join cluster					
	Cluster size: Small (1-5 Machines)					
	More about cluster sizes					
	Help Cancel Cancel					

Fig. 74 AppFabric Server configuration wizard. Cache Services

Specify a **Caching service account** by clicking **Change**... You must select a domain account with administrator permissions for all the machines. Moreover, this account has to have access to the SQL-server. In this example, it is the EleWise\ELMAadmin account. In the drop down list of **Caching Service configuration provider** (Fig. 74), select **SQL Server AppFabric Cashing Service Configuration Store Provider** and click **Configure...** next to the provider name.

The dialog box **AppFabric Server Caching Service configuration Store** will open (Fig. 75). In this dialog box, you need to:

- uncheck the **Create AppFabric Caching Service configuration database** box, since the database was created at the previous step (see выше).
- specify the name of your SQL server (VM name\SQL login) in the Server field. In this example, the VM name is SRV12DBLst, login – local (it is not specified).
- specify the name of the database for storing cache in the **Database** field. It is not the same database that was created for ELMA3-Enterprise; it is a new database for storing cache settings. In this example, the name ELMACache has also been specified in the configuration file.

i A	AppFabric Server Caching Service configuration Store
Si Si wi	pecify settings to create and register an AppFabric Caching Service configuration database ith the Microsoft SQL Server Provider.
Register /	AppFabric Caching Service configuration database.
Create Ap	pFabric Caching Service configuration database.
Connection	String
Server:	SRV12-1
Database:	ELMA Cache 🗸
Help	OK Cancel

Fig. 75 AppFabric Server Caching Service configuration Store

To save the changes, click **OK**.

You also need to select Join cluster at the Caching Service step (Fig. 74).

At the fourth step of the wizard (Fig. 72), you can specify the cache node ports and firewall parameters. Leave all the settings unchanged.

At the last step (Fig. 73), leave everything unchanged. Repeat these steps on each of the application servers.

4.4.2.4 Creating a cache and starting a cluster

After you have installed the AppFabric caching service on all the application servers, you need to execute several commands for creating a cache and starting a cluster.

Run the **PowerShell** console as the administrator on any application server (for example, 93.158.134.3 – SRV12-1). Go to **Start -> All Programs -> AppFabric for Windows Server -> Caching Administration Windows PowerShell** (Fig. 76).



Fig. 76 Start -> All Programs -> AppFabric for Windows Server -> Caching Administration Windows PowerShell

Consequently execute the following commands in the console:

Start-CacheCluster	Start the cluster. It was disabled before that.
Grant-	Grant permissions to the user, who starts the cache.
CacheAllowedClientAccount	
EleWise\ELMAAdmin	

Grant- CacheAllowedClientAccount ELMAAdmin	Grant permissions to the user, who starts the cache.					
New-Cache ELMACache	Create a cache.					
		Attention! The nar	ne must r	natch th	ne one sp	ecified in
	the	configuration	file	in	the	folder
	\\ELM	AConfig\ELMAShare	d\Config			
New-Cache ELMACache_NH	Create a cache.					
	Attention! The name must match the one specified in					
	the	configuration	file	in	the	folder
	\\ELMAConfig\ELMAShared\Config					
New-Cache	Create a cache.					
ELMACache_NH_Locks	Attention! The name must match the one specified in					
	the	configuration	file	in	the	folder
	\\ELMAConfig\ELMAShared\Config					

After that, you can start ELMA3-Enterprise and make sure that each server works without errors.

4.5. Starting the Farm and Creating Extended Configuration Files

At this stage, everything must be ready to start ELMA on each of the application servers. Two additional configuration extension files will be created.

Step 1. Start the ELMA3-Enterprise pool and site in the IIS manager on each application server.

Step 2. Check http://localhost on each application server – ELMA must start consequently on each server. If errors occur, check the section 6.9.

Step 3. Stop the pool on each application server.

Go to the server with the common configuration. In this example, it is 93.158.134.35 – ELMAConfig.

Step 4. Open the folder with the common configuration E:\ELMAShared\Config\WebApplication (Fig. 77). The **WebApplication** folder is created after the first start of the servers in the farm.



Fig. 77 Folder with the common configuration

Now you will work with the configuration extension files: **web.config.xslt.template** and **settings.config.template**.

Step 5. Rename the file **web.config.xslt.template** to **web.config.xslt**. This file will be used for making changes to ELMA configuration on each server from this folder.

All the lines from these two files are automatically copied when starting ELMA. This way, if you write a new line in the configuration file **web.config.xslt**, it will be copied to all the application servers to C:\\ELMA3-Enterprise\Web\.

Generate a machineKey. You can use online services for generating such keys. A key may look like this:

```
<machineKey
validationKey="C9ABD1186BBB9C9129586CD47F504395D26E7612344C29F895AB23E4B
D23D9E24B71DFF3B7BC73A3F81F9C0DC5C8A0A85
4EE1F00EFD010381C60659165557875"
decryptionKey="A5E13EF6BD6F1825B904B60DB9B42A9C2E113DE3124C80055F6FA6B7B
2DBE69B" validation="SHA1" decryption="AES" />
```

Add the generated key to the **web.config.xslt** file like this:

```
<xsl:template
match="/configuration/system.web[not(machineKey)]/trust">
```

<xsl:copy>

```
<xsl:apply-templates select="node()|@*"/>
```

</xsl:copy>

<machineKey
validationKey="C9ABD1186BBB9C9129586CD47F504395D26E7612344C29F895AB23E4B
D23D9E24B71DFF3B7BC73A3F81F9C0DC5C8A0A854EE1F00EFD010381C60659165557875"
decryptionKey="A5E13EF6BD6F1825B904B60DB9B42A9C2E113DE3124C80055F6FA6B7B
2DBE69B" validation="SHA1" decryption="AES" />

</xsl:template>

In this file, xsl:template match defines the computer key, which must be the same on all the servers.

For the farm to work correctly, enable the web session storing provider. To do so, add the following lines to the file:

</xsl:template>

DataSource – DBMS connection string. The system will use the ASPState database, created earlier.

The resulting file will look as follows:

<?xml version="1.0" ?>

<!-- Copy this file to the same folder under the name web.config.xslt, if it is necessary to configure additional application settings -->

```
<xsl:stylesheet
                         xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
version="1.0">
     <xsl:output indent="yes" />
     <xsl:template match="node()|@*">
       <xsl:copy>
         <xsl:apply-templates select="node()|@*"/>
       </xsl:copy>
     </xsl:template>
     <xsl:template match="sessionState">
       <!-- Web session storing provider -->
                         mode="SOLServer"
       <sessionState
                                                sqlConnectionString="data
                          ID=sa;Password=1234567;" cookieless="false"
source=SRV12DBLst;User
timeout="30"/>
     </xsl:template>
     <xsl:template</pre>
match="/configuration/system.web[not(machineKey)]/trust">
       <xsl:copy>
         <xsl:apply-templates select="node()|@*"/>
       </xsl:copy>
       <machineKey
validationKey="C9ABD1186BBB9C9129586CD47F504395D26E7612344C29F895AB23E4B
D23D9E24B71DFF3B7BC73A3F81F9C0DC5C8A0A854EE1F00EFD010381C60659165557875"
decryptionKey="A5E13EF6BD6F1825B904B60DB9B42A9C2E113DE3124C80055F6FA6B7B
```

```
2DBE69B" validation="SHA1" decryption="AES" />
```

</xsl:template>

</xsl:stylesheet>

Step 6. Rename the second configuration extension file **settings.config.template** to **settings.config**.

Add the following lines to this file:

<add key="Workflow.QueueLockTimeout" value="1"/> - message queue timeout lock.

<add key="NHibernate.QueryCacheEnabled" value="false"/> – enabling this parameter on the farm will cause cache operations to be executed consequently, which will significantly reduce performance.

<add key="Workflow.StateLockTimeout" value="30"/> - timeout for releasing locked resources in case of parallel tasks in a process. <add key="Workflow.WaitNextTaskTime" value="3"/> - timeout for opening the next process task. If a task/script/gateway is executed longer, a user will see the loading icon of the next task.

These parameters are required.

Also, add this line to the file:

<add key="Notifications.TemplatesEnabled" value="false"/>

This command disables system notifications about new tasks, completed tasks, etc. in the messages section.

Since users don't always need to use messages to receive information about new tasks (if ELMA is used as front-end or only for business processes), then notifications can be disabled.

The resulting file will look like this:

```
<?xml version="1.0" ?>
```

<!-- Copy this file to the same folder under the name settings.config, if it is necessary to configure additional application settings -->

<appSettings>

<!-Location of the shared folder, where the information about generated
reports will be stored --> <add key="FastReportStoragePath"
value="\\BM2\ELMAShared\Reports"/>

```
<!-- Time, during which the generated report is available (minutes)
```

```
<add key="FastReportStorageTimeout" value="10080"/>
```

```
<add key="Workflow.QueueLockTimeout" value="1"/>
```

<add key="NHibernate.QueryCacheEnabled" value="false"/>

```
<add key="Workflow.StateLockTimeout" value="30"/>
```

<add key="Workflow.WaitNextTaskTime" value="3"/>

```
<add key="Notifications.TemplatesEnabled" value="false"/>
```

```
</appSettings>
```

Step 7. Now start the ELMA3-Enterprise pool on each server.

Make sure that each server is started. Take into account the fact, that only one server starts at a time, while others show "0% Waiting for another server to start".

Step 8. Now you need to enable data reading from the database snapshot. It will greatly lower the probability of locking in case of numerous requests.

To do so, open MS SQL Management Studio, connect to the main DBMS server and execute the following command in the exclusive mode:

ALTER DATABASE [DATABASE_NAME] SET READ_COMMITTED_SNAPSHOT ON;

While there are no other connections, or if this step has not been fulfilled when creating a database, force-switch the database to the exclusive mode.

Attention! If you intend to restore the database using a backup copy from the server, where this command has not been executed, in order to transfer data or a configuration, you need to repeat it for the relevant database after restoring.

Next, proceed to configuring the farm controller. Users are going to access ELMA via the controller, instead of directly via each application server.

4.6. Configuring the farm controller

At this moment, ELMA must be running on all the application servers.

Allocate a separate machine for the farm controller. In this example, it is 93.158.134.30 – WFCONTROLLER. Users will log in to ELMA via this server.

Step 1. Install and configure IIS (see paragraph 4.2).

Step 2. Install Microsoft Application Request Routing Version 3 for IIS. Three additional components will be installed, including WebFarm framework and URL Rewrite. The easiest way to install it is by using <u>WPI launcher</u> (web platform installer). For the launcher to work, active Internet connection is required (direct or via a proxy server).

To open the web platform installer, go to the IIS Manager and select **Web Platform Installer** in the **Management** unit (Fig. 78).



Fig. 78 IIS Manager. Web Platform Installer icon

In WPI launcher, find and install:

- Application Request Routing (ARR)
- URL Rewrite

• WebFarm framework

If all the components are installed successfully, a respective notification will be shown (Fig. 79).

Web Platform Installer								
PREREQUISITES	INSTALL	CONFIGURE	FINISH					
The following produced	✓ The following products were successfully installed.							
External Cache 1.1 URL Rewrite 2.1								
Application Request	Routing 3.0							
			Finish					

Fig. 79 Web Platform Installer dialogue box

If these packages were not found, you can download and install them manually. Note, that Windows Server 2012 does not support WebFarm Framework version 2, i.e. you need to install version 1 or 3.

Step 3. Open the IIS Manager. In the application pool, select **DefaultAppPool**, click **Advanced Settings**... in the right menu and configure the following settings (Fig. 80):

- In Idle Time-out (minutes), set "0";
- In Regular Time Interval (minutes), set "0".

lv a	anced Settings		?	2
	/CD			
	(General)		-	-
	Process Model			
	Identity	ApplicationRoolIdentity		
	Idle Time-out (minutes)	n	11	
	Load Liser Profile	False	-	
	Maximum Worker Processes	1		
	Ping Enabled	True		
	Ping Maximum Response Time (second	90		
	Ping Period (seconds)	30		
	Shutdown Time Limit (seconds)	90		
	Startup Time Limit (seconds)	90		
+	Process Orphaning			
+	Rapid-Fail Protection			
-	Recycling			
	Disable Overlapped Recycle	False		
	Disable Recycling for Configuration Ch	False		
+	Generate Recycle Event Log Entry			
	Private Memory Limit (KB)	0		
	Regular Time Interval (minutes)	0		
1	Request Limit	0		
÷	Specific Times	TimeSpan[] Array		
	Clarks and Management Clarks (1275)	0		4

Fig. 80 Pool advanced settings

It is necessary to avoid delays or errors that occur in case of a time-out or unexpected restart, since all the HTTP requests and responses go through the application request routing system.

To save the changes, click **OK**.

Step 4. Since requests will go through the controller, it is important to remove certain default restrictions to avoid receiving errors due to the request length (404 not found) and stand-by period (502).

Attention! If you skip this step, the Tasks tab in the process monitor will return the 404 error.

A controller with a configured URL Rewrite uses the settings of the site that is being requested and the request is redirected to the farm from this site. By default, it is the Default Web Site; therefore, you need to configure all the settings mentioned in this section in the IIS Manager for **Default Web Site**.

1. In the IIS Manager, select **Sites – Default Web site** and click **Configuration Editor** in the **Management** unit (Fig. 81).

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Ready		1.1

Fig. 81 IIS Manager. Default Web Site. Configuration Editor icon

2. In the configuration editor, open the **Section** drop-down list and go to **system.webServer/security/requestFiltering** (Fig. 82).

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<u>File View H</u> elp					
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	Section: system.webServer	/security/requestFiltering	From: Default Web Site Web.config		
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	- L directo	ryBrowse			
	-/ handle	rs rors			
	-Z httpLo	gging			
	- httpPr	otocol			
	-Z httpTr	acing			
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Configuration: Default Web Site We	.config	ion I	v	1 .:	

Fig. 82 IIS Manager. Section drop-down list

3. In the opened section, set the **maxQueryString** parameter to "2000000" (Fig. 83) and click **Apply** in the right menu.

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	Features View		
Conriguration: Default Web Site We	b.conrig		1 .:

Fig. 83 IIS Manager. "system.webServer/security/requestFiltering" section

This parameter filters requests by the maximum length and this value has to be large enough. That is why it is recommended to use the value "2000000".

Step 5. After completing the **Steps 2-4**, the **Server Farms** item should appear in the IIS Manager (Fig. 84). If this item is absent, try restarting the IIS Manager. If it did not work, then WebFarm Framework was not installed. Install it as described above (see **Step 2**).

Right click on this item to open the context menu and select **Create Server Farm**... (Fig. 84).
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File View Help	
Start Page Configuration Editor Start Page Section: DEMOCE310 (DEMOCE310) Decepted Path: MACHINE/WEBROOT/APPHOST/Default Image: Start Page Decode and the start is a start in the start in th	Default Web Site Web.config Web Site Configuration Search Configuration
Configuration: Default Web Site Web.config	• <u>.</u>

Fig. 84 IIS Manager. Server Farms context menu

The **Create Server Farm** dialog box will open (Fig. 85). In the **Server farm name** field, enter the name of the created farm and click **Next**. In this example, the farm name is **ELMA3**.

	Create Server Farm	? X
Specify Server Farm Name		
Server farm name: ELMA3 ☑ Online	Назад Далее Готово	Отмена

Fig. 85 "Create Server Farm" dialog box

At the next step (Fig. 86), in the **Server address** field enter the IP-address of the application server or its name (in this case, **SRV12-1**) and click **Add**.

		Create Serv	er Farm		? X
Add Server					
Server address: ELMAAPPSRV01 ✓ Online Advanced settings			<u>A</u> dd <u>R</u> emove		
Server Address	Status				
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Fig. 86 "Create Server Farm" dialog box

In a similar way, add the IP-addresses or names of all the required application servers (Fig. 87):

- 93.158.134.3 SRV12-1
- 213.180.204.3 SRV12-2

		Create Serv	er Farm		? X
Add Server					
<u>S</u> erver address: ✓ <u>O</u> nline Advanced settings			<u>A</u> dd <u>R</u> emove]	
Server Address	Status				
ELMAAPPSRV04	Online				
ELMAAPPSRV03	Online				
ELMAAPPSRV02	Online				
ELMAAPPSRV01	Online				
	[<u>Н</u> азад	Далее	<u>Г</u> отово	Отмена

Fig. 87 "Create Server Farm" dialog box

To save the changes, click **Finish**.

If all the components were installed successfully, a dialog box will open (Fig. 88) notifying, that the **URL Rewrite** rule will be created automatically for routing incoming requests to this server farm. Click **Yes** in this dialog box.



Fig. 88 Notification about creating a URL Rewrite rule

If the dialog box does not open, make sure that the **URL Rewrite** is installed: go back and return the **Step 5**. If necessary, you can create the rule manually (see section 6.6). After that, the **ELMA3** nested item will be added to the **Server Farm** item in the IIS Manager. Next, you need to configure certain parameters of the farm.

Step 6. Configure the load balancing using the application requests routing. This procedure defines the application requests routing with an algorithm that evenly distributes incoming requests among the web servers.

In the IIS Manager click on the name of the created farm (**ELMA3**) and go to the **Load Balance** unit on the **Server Farm** panel (Fig. 89).



Fig. 89 IIS Manager. Server Farm. Load Balance icon

In the opened section (Fig. 90), select **Weighted round robin** in the **Load balance algorithm** field; select **Even distribution** in the **Load distribution** field. After that, click **Apply**.

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Configuration: 'localhost' application	nHost.config	€1.:

Fig. 90 IIS Manager. "Load Balance" section

Next, open the ELMA3 farm management panel and go to the **Routing Rules** section on the **Server Farm** panel (Fig. 91).



Fig. 91 IIS Manager. Server farm. Routing Rules icon

In the opened section (Fig. 92), check the boxes **Use URL Rewrite to inspect incoming requests** and **Enable SSL offloading**. To save the changes click **Apply**.

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Configuration: 'localhost' applicationHost.config	San 1997 -

Fig. 92 IIS Manager. "Routing Rules" section

Next, open the **ELMA3** farm management panel and go to the **Health Test** section on the **Server Farm** panel (Fig. 93).



Fig. 93 IIS Manager. Server farm. Health Test icon

In the opened section (Fig. 94), fill in the following fields:

• URL

string:

http://192.168.19.41/StartInfoHandler.ashx?type=Availability where 192.168.19.41 – the controller server address;

- Interval (seconds) set to 5;
- Time-out (seconds) set to 30;
- Acceptable status codes set to 200.



Fig. 94 IIS Manager. Health Test section

To save the changes, click **Apply**.

Open the ELMA3 farm control panel and go to the **Server Affinity** section on the **Server Farm** panel (Fig. 95).

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Connections	Actions Remove Server Farm Take Server Farm Offline Add Servers P Help Online Help
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Fig. 95 IIS Manager. Server farm. Server Affinity icon

In the opened section (Fig. 96), uncheck the **Client Affinity** box.

Image: Server Farms File Vew Help Image: Server Farms Image: Server Farms <	🐂 Internet Information Servic	es (IIS) Manager		
File View Help Connections Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Start Page Default Web Start Start Page EtMa3-CE Ignore subdomains Content Web Ignore subdomains Content Web Ignore subdomains Ignore subdomains <td></td> <td>0 ♦ Server Farms ♦ ELMA3 ♦</td> <td></td> <td>😥 🖂 👔 i 😰 👻</td>		0 ♦ Server Farms ♦ ELMA3 ♦		😥 🖂 👔 i 😰 👻
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Configuration: 'localhost' applicationHost.config	Connections Start Page DEMOCE310 (DEMOCE31 Application Pools Sites Default Web Site Construction Server Farms DEMA3 ELMA3 ELMA3	Server Affinity Use this feature to configure how Application Request Routing should affinitize requests to the content servers. Client Affinity Clignt affinity Ingnore subdomains Cookie name: ARRAffinity Host Name Affinity Use host name Host name Ingnore subdomains Ime-out (minutes): 20 Features View Content View	×	Actions Apply Cancel Help Online Help
	Configuration: 'localhost' application	Host.config		€ 1.:

Fig. 96 IIS Manager. Server Affinity section

To save the changes, click **Apply**.

Attention! This parameter is not required, however, we recommend unchecking this box to ensure even load distribution.

If this box is checked, all the requests will be sent to the server, to which the first request from this client was sent; otherwise – to the first unoccupied server.

If the box is checked, the load is distributed less evenly, but the server may respond faster in some cases. Since the increase in the speed is insignificant, it is recommended that you uncheck this box, because there is a risk that most users will be tied to the same server, while all the other servers of the farm will remain idle.

Next, open the ELMA3 farm management panel and go to the **Proxy** section in the **Server Farm** unit (Fig. 97).

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Ready	9 .:

Fig. 97 IIS Manager. Server farm. Proxy icon

In the opened section (Fig. 98), increase the value in the **Time-out** (seconds) field to 600 seconds.

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Connections	Proxy Use this feature to configure proxy settings for Application Request Routing. HTTP vergion: Pass through Ime-out (seconds): GOO Reverse rewrite host in response headers Custom Headers Preserve client IP in the following header: X-Forwarded-For Include TCP port from client IP Eorward encoded client certificate in the following header: X-ARR-ClientCert	Actions Apply Cancel Help Online Help
Configuration: 'localhost' applicatio	nHost.config	1 .:

Fig. 98 IIS Manager. Proxy section

To save the changes, click **Apply**.

If this value is exceeded during the page generation, the error 502 will be returned.

Step 7. It is recommended that you disable IIS logging.

If you intend to use the IIS log, you can skip this step; otherwise, it is recommended that you follow the described procedures.

If there are many users, the IIS log may take up to several gigabytes of the controller's space by creating a log file every day. If you do not disable the IIS log, remember to check the controller's free space from time to time.

To disable the log, open the main page of the IIS Manager and select **Logging** in the **IIS** unit (Fig. 99).

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Image: Start Page DEMOCE310 Home Start Page DEMOCE310 DEMOCE3 Image: Start Page DEMOCE310 DEMOCE3 Image: Start Page Image: Start Page Image: Start Page Image: Start Page	Actions Open Feature Manage Server Restart Start Stop View Application Pools View Sites Manage WCF and WF Services Configure Change .NET Framework Version Image Help Online Help
Ready	•=.:

Fig. 99 IIS Manager. Server farm. Logging icon

In the opened section (Fig. 100), select **Disable**.

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Connections Start Page DEMOCE310 (DEMOCE31 Application Pools Constant Default Web Site Default W	Logging Use this feature to configure how IIS logs requests on the Web server. One log file per: Site Site Log File Format: W3C Select Fields Directory: %SystemDrive%\inetpub\logs\LogFiles Encoding: UTF-8 Log File Rollover Select the method that IIS uses to create a new log file. © Schedule: Daily Output Maximum file size (in hytes):	Actions Apply Cancel Disable View Log Files Pier Piles Online Help
	E Features View Content View	A*
Configuration: 'localhost' applicatio	nHost.config	S.:

Fig. 100 IIS Manager. Logging section

Chapter 5. Maintenance

This section describes the main procedures for maintaining the system components and the automation of these procedures.

5.1. Database maintenance

Database maintenance usually includes creating backup copies and automating this process to avoid uncontrolled growth of the number of backup copies.

5.1.1. Creating a database backup copy manually

Before making any changes to ELMA, it is very advisable that you manually create a backup copy even if you are confident, that a backup copy has been created automatically.

You should store manually created backup copies for a week, and delete them only if there are newer backup copies.

To create a database backup copy, follow this procedure:

1. Connect to the main database server – 192.168.18.230

If you are using the failover cluster and the MS SQL AlwaysOn availability group, creating backup copies may be allowed only on a particular server, all the others will display a respective warning.

In this case, it is specified in the cluster that backup copies will be created from the main replica – 192.168.18.230.

2. Make sure that there is enough disk space for storing database backup copies.

If there is not enough disk space:

- delete unnecessary files;
- delete old backup copies if there are newer copies;
- archive old backup copies. In case of archiving, take into account that the backup copies, created with compression, will not be compressed after archiving.
- 3. Start MS SQL Management Studio and connect to the instance of MS SQL Server (Fig. 101).



Fig. 101 MS SQL Server Management Studio. Authentication dialog box

In the context menu of the database, select **Tasks – Back Up...** (Fig. 102).

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	Start PowerShell		Shrink •		
	Reports >		Back Up		
	Rename		Restore •		
	Delete		Generate Scripts		
	Refresh		Extract Data-tier Application		
	Properties		Deploy Database to SQL Azure		
			Export Data-tier Application		
			Register as Data-tier Application		
			Upgrade Data-tier Application		
			Delete Data-tier Application		
			Import Data		
Ready			Export Data		h

Fig. 102 MS SQL Server Management Studio. Database context menu

In the opened dialog box (Fig. 103), on the **General** page, make sure that you have selected **Full** in the **Backup type** field and specified a backup location

(the shared folder for backup copies, created earlier) in the **Destination** unit. To specify a location, click **Add**...

🥛 Back Up Database - ELMAPF	ROD38			_ 🗆 🗙
	🛒 Script 👻 📑 Help			
General				
	Source			
	Da <u>t</u> abase:		ELMAPROD38	▼
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	Bac <u>k</u> up type:		Full	•
	Copy-only Backup			
	Backup component:			
	Database			
	C Files and filegroups:			
	Backup set			
	<u>N</u> ame:	ELMAPROD38	-Full Database Backup	
	Description:			
	Backup set will expire:			
	 After: 	0	÷ days	
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Server:	Destination	-		
DEMOCE310	Back up to:	• Djsk	C Tage	
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Jew connection properties				
				<u>H</u> emove
	1			Contents
Ready				
			OK	Cancel

Fig. 103 Back Up Database window. General page

Next, on the **Options** page (Fig. 104) in the **Compression** unit select **Compress backup** from the drop down list.

🥛 Back Up Database - ELMAPI	ROD38	
	🛒 Script 👻 📑 Help	
General		
Coptions	Overwrite media	
	Back up to the existing media set	
	Append to the existing backup set	
	O Dverwrite all existing backup sets	
	Check media set name and backup set expiration	
	Media set <u>n</u> ame:	
	Back up to a new media set, and erase all existing backup sets	
	New media <u>s</u> et name:	
	New media set description:	* *
	Reliability	
	Verify backup when finished	
	Perform checksum before writing to media	
	Continue on error	
	Transaction log	
Server: DEMOCE310	O Truncate the transaction log	
Connection:	${f O}$ Back up the tail of the log, and leave the database in the restoring state	
sa	Tape drive	
View connection properties	Unload the tape after backup	
	Rewind the tape before unloading	
	Compression	
Ready	Set backup compression: Compress backup	-
	Use the default server setting	
	Do not compress backup	
	OK Ca	ancel

Fig. 104 Back Up Database window. Options page

Experience has shown that using compression reduces the backup file size more than ten-fold.

To save the changes, click **OK**. After that, the progress indicator will be displayed.

If any errors occur at this stage, you should eliminate them according to general recommendations.

Once the backup copy has been created, you will see a respective dialog box.

It is recommended that you automate the backup process. To learn more, see section 5.1.3.

5.1.2. Compressing transaction log manually

Since the Full recovery model is selected in the database settings, the transaction log size will be gradually increasing in operation. Limiting its

maximum size is highly discouraged, since the database will stop executing requests upon reaching the maximum size.

The nature of MS SQL files implies, that the transaction log file may take a significant amount of disk space, while on the inside being 97% reusable. Therefore, backing up the transaction log will free the file space for rewriting, but it will take the same disc space as before these actions.

The correct solution is automatic backup of the transaction log (see section 5.1.3). In this case, the transaction log file will always be around the same size, depending on ELMA load.

You can compress the transaction log file on the hard drive at any moment by creating two backup copies of the transaction file (to learn more, see section 5.1.1). It is important that both backup copies were created with the **Transaction log** type (Fig. 105) and were available simultaneously (you cannot create the first one, delete it, and then create the second).

📋 Back Up Database - ELMAPA	ROD38			_ 🗆 🗙
	🔄 Script 👻 📑 Help			
General				
E options	Source			
	Database:		ELMAPROD38	T
	Recovery <u>m</u> odel:		SIMPLE	
	Bac <u>k</u> up type:		Transaction Log	•
	Copy-only Backup			
	Backup component:			
	Database			
	C Files and filegroups:			
	Backup set			
	<u>N</u> ame:	ELMAPROD3	8-Full Database Backup	
	Description:			
	Backup set will expire:			
	 After: 	0	- days	
Connection	0 <u>0</u> n:	05.07.2017	~	
Server:	Destination			
DEMOCE310	Back up to:	 Djsk 	O Tage	
Connection: sa	C:\SRV12\ELMAPROD38.bak			A <u>d</u> d
View connection properties				<u>R</u> emove
				Contents
C Ready				
			OK	Cancel

Fig. 105 Back Up Database window. General page

After that, in the database context menu select **Tasks – Srink – Files** (Fig. 106).



Fig. 106 MS SQL Server Management Studio. Database context menu

In the File type field, select Log and click OK (Fig. 107).

📒 Shrink File - ELMAPROD38_I	og		
	🔄 Script 👻 📑 Help		
General	The size of the databas shrink all database files,	se is reduced by shrinking in use Shrink Database.	dividual files to release unallocated space. To
	<u>D</u> atabase:	ELMAPROD38	
	Database files and filegr	oups	
	File <u>t</u> ype:	Log	
	Filegroup:	<not applicable=""></not>	
	<u>F</u> ile name:	ELMAPROD38_log	v
	Location:	c:\Program Files\Microsoft	SQL Server\MSSQL11.MSSQLSERVER\MSSQL\
	<u>C</u> urrently allocated sp	pace:	1,00 MB
	<u>Available free space</u>		0,63 MB (63%)
	Shrink action		
	• <u>R</u> elease unused	space	
Server:	C Reorganize page	s before releasing unused sp	ace
DEMOCE310	Shrin <u>k</u> file to:		1 MB (Minimum is 0 MB)
Connection: sa	C Empty file by migr	ating the data to other files in	the same filegroup
View connection properties			
C Ready			
			OK Cancel

Fig. 107 Shrink File window

Attention! Compressing the data themselves (File type – Data) is highly discouraged.

5.1.3. Creating automatic maintenance plan for ELMA databases

Automatic maintenance plan for databases is required in order to automate certain obligatory operations, such as:

- backing up ELMA database to provide the possibility to recover in case of critical errors while updating the configuration or unexpected server shutdowns and data corruption;
- backing up the transaction log of ELMA database and ASPState database to prevent uncontrolled growth of log-files. This operation ensures, that the logfile is 90-95% reusable and the system automatically uses this space. To learn more read the article <u>"Manage the Size of the Transaction Log File".</u>

We recommend that you simultaneously store from three to seven backup copies for the last days, i.e. you will need to create maintenance plans for each day (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday) or at least three copies for several weekdays (Monday – Thursday, Tuesday – Friday – Sunday, Wednesday – Saturday). Backing up is configured to rewrite the existing copies. i.e. the backup copy of the last Monday will be automatically deleted and a new copy will be created on the next Monday.

Attention! Make sure that the hard drive for backup copies has enough space to spare. If the hard drive runs out of free space, a new backup copy will not be created. It may lead to the growth of transaction log files in the database and to failure to recover after a malfunction. You may also need to manually create backup copies, which will also take up the disk space.

To create a maintenance plan for one weekday, follow the procedure described below.

Step 1. Open MS SQL Management Studio on the primary replica. In the tree, go to **Management – Maintenance Plans** and select **Maintenance Plan Wizard** in the context menu (Fig. 108). The Maintenance Plan Wizard will open (Fig. 109).



Fig. 108 MS SQL Server Management Studio. Management – Maintenance Plans

Step 2. Create a maintenance plan using the Wizard.

- 1. Skip the first step of the wizard by clicking **Next**.
- 2. At the next step (Fig. 109), fill in the required fields and click Next.

B	Maintenance Plan Wizard	-		x
Select Plan Properties How do you want to schedule your maintenance tasks?				
Name:	ELMA Prod Backup + ASPnet jomals [Friday]			
Description:	Backup copy ELMAProd DB & ASPnet jornals		^ ~	
Run as:	SQL Server Agent service account		*	
 Separate schedules Single schedule for t 	for each task he entire plan or no schedule			
Scheduled (On Deman	d)	Chan		
Hot scheddied (off Dellia	My	Crian	ye	
Help	< Back Next > Finish	(Cance	si

Fig. 109 Maintenance Plans Wizard. Step 2

In the **Name** field, enter the maintenance plan name. It is recommended that you give an understandable name that specifies the weekdays, on which the maintenance will be performed.

In the **Run as** field, select **SQL Server Agent service account**. Below this field, select **Single schedule for the entire plan or no schedule**. This way, when creating backup copies, the inbuilt account will be used. Permissions of this account has been configured earlier, when installing a DBMS. You can specify a different account.

Click **Change...** next to the **Schedule** field. In the opened dialog box (Fig. 110), configure the schedule for this maintenance plan and click **OK** to apply the changes.

	New Job Schedule
Name:	ELMA Prod Backup + ASPnet jomals (Friday) Jobs in Schedule
Schedule type:	Recurring V Enabled
One-time occurrence	
Date:	8/ 9/2017 ∨ Time: 5:14:21 PM 🔦
Frequency	
Occurs:	Weekly 🗸
Recurs every:	1 🗘 week(s) on
	Monday Wednesday ✓ Friday Saturday
Daily frequency	
 Occurs once at: 	10:30:00 PM 🗘
Occurs every:	1 ↔ hour(s) ✓ Starting at: 12:00:00 AM ↔
	Ending at: 11:59:59 PM
Duration	
Start date:	1/11/2017 ■▼ O End date: 8/ 9/2017 ■▼
	No end date:
Summary	
Description:	Occurs every week on Friday at 10:30:00 PM. Schedule will be used starting on 1/11/2017.
	OK Cancel Help

Fig. 110 Creating a schedule

First, specify the frequency and weekdays in the **Frequency** unit. In this example, we intend to create seven similar maintenance plans for each weekday:

- Occurs Weekly;
- **Recurs every** 1 week(s) on Friday.

Next, define the time when a backup copy will be created. It is recommended that you select time after the working hours with 2-4 spare hours (for the system maintenance). In the **Daily frequency** unit, switch to **Occurs once at** and specify a time. In this case, it is 22:30.

Attention! Do not select a very late time unless it is necessary, since in case of an emergency an employee will have to wait until backing up is complete. 3. At the next step (Fig. 111), select the actions that should be performed as part of maintenance. Check the boxes next to **Back Up Database (Full)** and **Back Up Database (Transaction Log)**.

B	Maintenance Plan Wizard	-		x
Se	lect Maintenance Tasks Which tasks should this plan perform?			Ju -
Sele	ct one or more maintenance tasks:			
	Check Database Integrity Shrink Database Reorganize Index Rebuild Index Update Statistics Clean Up History Execute SQL Server Agent Job Back Up Database (Full) Back Up Database (Differential) Back Up Database (Transaction Log) Maintenance Cleanup Task) The Back Up Database (Full) task allows you to specify the source datab	ases,	destin	ation
	files or tapes, and overwrite options for a full backup.			
	Help < Back Next > Finish	(Cance	el

Fig. 111 Maintenance Plan Wizard. Step 3

To go to the next step of the wizard, click **Next**.

4. At the next step (Fig. 112), select the order of the tasks, selected at the previous step (Fig. 111). It is recommended to perform full database backup first and then the transaction log backup. Such order requires more disk space, but it is more reliable.

🗃 Maintenance Plan Wizard 💻	
Select Maintenance Task Order In which order should these tasks be performed?	Jes .
Select the order for the tasks to execute:	
Back Up Database (Full) Back Up Database (Transaction Log)	
Move Up Move	Down
The Back Up Database (Full) task allows you to specify the source databases, files or tapes, and overwrite options for a full backup.	destination
Help < Back Next > Finish ()	Cancel

Fig. 112 Maintenance Plan Wizard. Step 4

If the disk space is insufficient, change the maintenance task order: first, back up the transaction log and second, back up the database. With this order, the size of the full back up copy would be smaller.

To go to the next step of the wizard, click **Next**.

5. At this step (Fig. 114), configure full backup of the database.

In the **Database(s)** field (Fig. 113), open the drop down list, select **Specific databases** and select the ELMA database by checking the box next to the required database. In this case, it is **ELMAPROD38**. After that, click **OK**.

1	Maintenance Plan Wizard 📃 🗖 🗙
Define Back Up Da Configure the maintenar	atabase (Full) Task
General Destination Option Backup type:	ns Full
Database(s):	<select more="" one="" or=""></select>
Backup component Database Files and filegroups: Back up to: 	 All databases System databases All user databases (excluding master, model, msdb, tempdb) These databases: ASPState ELMA3Prod ElmaCache master
Schedule: Not scheduled (On Demand) Help	Ignore databases where the state is not online OK Cancel

Fig. 113 Maintenance Plan Wizard. Step 5

Next, select **Back up databases across one or more files** (Fig. 114) and specify a location for creating backup copies.

- Ef	Maintenance Plan Wizard	_ 🗆 X
Define Back Up Database Configure the maintenance task.	(Full) Task	a dea
Genera Destination Options		
Back up databases across one or	more files:	
C:\Backup\AutoBackups\ELMAProd\	ELMA3Prod.bak	Add Remove Contents
If backup files exist:	Overwrite	~
Create a backup file for every data	base	
	C:\SRV12	
This backup type is not supported of replica.	n a secondary replica and this task will fail if the task runs on a secondary	
Help	< Back Next > Finish >>I	Cancel

Fig. 114 Maintenance Plan Wizard. Step 5

To specify a location, click **Add...** In the opened dialog box (Fig. 115) select **File name** and specify a database files location. To save the changes, click **OK**.

Ū	Select Backup Destination	x				
Select ti backup	Select the file or backup device for the backup destination. You can create backup devices for frequently used files.					
Destinat	tions on disk File name:					
	soft SQL Server\MSSQL12.MSSQLSERVER\MSSQL\Backup Backup device:					
	✓					
	OK Cancel]				

Fig. 115 Selecting a backup location

It is important that you specify a location and a file name without overlapping with other maintenance plans, so that a backup copy for another day was not deleted accidently.

After that, in the **If backup files exist** field, select **Overwrite** (Fig. 114). Thus, this maintenance plan will always back up to the same file.

If you are using a failover cluster, the bottom of the page may display a warning (Fig. 116), that this operation can be performed only on the main replica. If server roles are frequently swapped, you can duplicate all the maintenance plans for the second replica to increase reliability. The maintenance plan has an inbuilt check, so if it is used on a secondary replica, the action is not performed.

Usually, you don't need to do that, since in case of often failures of replicas it is better to find the reason behind these issues, instead of adapting to them.

Next, in the **Set backup compression** field, select **Compress backup** (Fig. 116), so that database backup copies were compressed on the hard drive. Usually, compression allows reducing the database backup file size up to tenfold.

- BJ	Maintenance Plan Wizard	_ 🗆 X				
Define Back Up Database (Full) Task Configure the maintenance task.						
Set backup compression:	Compress backup					
Backup eet will evoire:	Compress beercap					
Conv only backup						
Vorific booksup						
Backup encryption						
Algorithm:	AEC 120					
For an attack its data barren i an an attack						
For availability databases, ignore replica pronty for backup and backup on primary settings						
A This backup type is not supported on a replica.	a secondary replica and this task will fail if the task runs on a secondary					
Help	< Back Next > Finish >>	Cancel				

Fig. 116 Maintenance Plan Wizard. Step 5

To go to the next step of the wizard, click **Next**.

6. At this step (Fig. 117), configure transaction log backup. This step is similar to the full database backup (see step 5 above).

However, in the **Database(s)** field, you need to select **Specific databases** and select two databases: **ASPState** and **ELMAPROD38** (Fig. 117).



Fig. 117 Maintenance Plan Wizard. Step 6

The ASPState database's size may be around 1 MB, but since it is included in the availability group, it requires the full recovery mode; therefore, its transaction log will grow. To avoid it, back up the transaction log of this database as well as the ELMA database.

Next, select **Back up databases across one or more files** (Fig. 118) and specify a location for saving backup copies. You must specify a file, different from the one above, so that the transaction log backup did not overwrite the data backup.

ĩ	Maintenance Plan Wizard	x c
Define Back Up Configure the mainte	Database (Transaction Log) Task nance task.	1 con
General Destination	ptions	
Back up databases C:\Backup\AutoBacku	across one or more files: skitage.com <a a="" href="https://www.skitage.com" www.skitage.com"="" www.skitage.com<="">	d
	Conte	ents
If backup files exist:	Overwrite	~
O Create a backup fil	for every database	
	C:\SRV12	
	https:// <storageaccount>.blob.core.windows.net/</storageaccount>	
Schedule: Not scheduled (On Dema		
Help	< Back Next > Finish >> Car	ncel

Fig. 118 Maintenance Plan Wizard. Step 6

In the **Set backup compression** field (Fig. 116) select **Compress backups**.

Attention! If a backup file has already been created without compression (e.g. for the last Monday), it cannot be overwritten with a compressed backup of the transaction log.

When you change the **Set backup compression** parameter, you also must move or rename the previous backup copy version (e.g. rename "ProdBackup_Monday.bck" into "ProdBackup_Monday_old.bck").

Unfortunately, it is not always possible to compress the transaction log backup. If possible, it will be compressed after the data backup, and if impossible, an error may be returned.

To go to the next step of the wizard, click **Next**.

7. At this step (Fig. 119), configure the report options. It is recommended that you save a text log of the maintenance plan execution, so that you could see possible errors. To do so, check the box **Write a report to a text file**.

In the **Folder location** field, you can specify a folder for saving the file.

- Ef	Maintenance Plan Wizard	_ □	x
Select Report Opti Select options for saving actions.	ons or distributing a report of the maintenance plan		
✓ Write a report to a text file			-
Folder location:	C:\Backup\AutoBackups\SchedulerLo	al	
E-mail report			
To:			Y
Help	< Back Next > Finish >>	Cance	a

Fig. 119 Maintenance Plan Wizard. Step 7

To go to the next step of the wizard, click **Next**.

8. At the last step (Fig. 120), confirm all the selected options and click **Finish**.

B	Maintenance Plan Wizard	
C	Dmplete the Wizard Verify the choices made in the wizard, and then click Finish.	· Ju
Clic	k Finish to perform the following actions:	1.1
	Maintenance Plan Wizard	
	Help < Back Next > Finish	Cancel

Fig. 120 Maintenance Plan Wizard. Step 8

Wait until the maintenance plan is created, it may take a while.

Once this procedure is finished, the wizard will display the respective notification (Fig. 121), and you will be able to view a report on the results.

ß	Maintenance	Plan Wizard	_ D X
Mai (Intenance Plan Wizard Progree Click Stop to interrupt the operation.	255	-
	Success	5 Total 5 Success	0 Error 0 Warning
Deta	ails:	-	
	Action	Status	Message
	Creating maintenance plan "ELMA Pro	Success	
	Adding tasks to the maintenance plan	Success	
	Adding scheduling options	Success	
0	Adding reporting options	Success	
0	Saving maintenance plan "ELMA Prod	Success	
		Stop	Report V
			Close

Fig. 121 Maintenance Plan Wizard. Last step

If necessary, create maintenance plans for the other weekdays in a similar way.

5.1.4. Disabling automatic backup upon updating

Every time the structure of the ELMA database is updated, the database backup copy is created. Usually, disabling this procedure is inadvisable; however, when you use a database cluster, it is recommended that you back up according to a schedule and manually when making changes to the configuration.

It is connected, first, to certain peculiarities of creating backups in a cluster, and second, to managing empty disk space.

Since full recovery model is obligatory for database clusters, the size of backup copies may be significant by default. Check if there is enough disk space.

Attention! This step is not obligatory. When disabling automatic back up upon restarting, you must set up a respective maintenance plan and/or create backup copies manually. To disable database back up upon starting the ELMA server, edit the configuration file **configuration.config** – in **connectionStrings**, in the **main** line add backupEnabled="false" after EleWise.ELMA.Extensions.MSSQL (after the closing quotation mark).

5.1.5. Recovering a database from a backup copy / moving a database

To recover a database in an availability cluster from a backup copy, you need to temporary disable databases in the availability group. In addition, we recommend that you delete the database from the secondary replica.

Attention! When planning to recover a database from a backup copy, take into account that during this procedure the database will be unavailable as well as all the applications using it. The recovery time depends on the database size. When you estimate the time the procedure takes, consider the time for secondary data synchronization between replicas.

Recovering a database of about 800 GB on high capacity servers with a good connection channel may take around five hours.

It is recommended that you schedule database recovery for Friday evening (after users completed their work in the system). This way you will have maximum amount of time for all the necessary procedures.

- 1. To start recovering a database from a backup copy, connect to all the DBMS replicas using MS SQL Management Studio.
- 2. Make sure that the backup copy is available on the main replica (Fig. 122). If you use network drives, having high data transfer speed between servers is advisable, since it directly affects the duration of the restoration procedure.

🔒 Backups							
G O - 📕 - Computer - Local Disk (C:) - Backups - 🚱 Search Backups					2		
Organize 🔻 Include in lib	Organize 🔻 Include in library 👻 Share with 👻 New folder						
🔺 Favorites	Name ^	Date modified	Туре	Size			
Desktop Recent Places Downloads Libraries Documents	ElmaProd_Backup.bak	05.07.2017 16:46	BAK File	951 518 KB			
Music	1						
1 item							

Fig. 122 Main replica. Backup copy

 Delete the database you intend to recover from the availability group. To do so, in MS SQL Management Studio open the AlwaysOn High Availability, Availability Groups – Availability Databases, right click on the required database and select Remove Database from Availability Group... (Fig. 123).



Fig. 123 MS SQL Management Studio. Database context menu

In the opened dialog box (Fig. 124), click **OK**.

ķ	Remove Database from Availability Group 'Group'	- 🗆 X
🕕 Ready		
Select a page	Script • The Help This will completely remove the listed databases from availability group ('Group'), ar database will no longer participate in the availability group. To remove the listed dat OK.	nd the abases, click
	Name	Result
	ELMA3Prod	
Connection SRV1-2BOOK [BOOK\bookadmin]		
View connection properties		
Progress		
Ready		
	OK Cancel	Help

Fig. 124 Removing a database from an availability group

4. Make sure, that this database has the "Not Synchronizing" status in the list of the secondary replica's databases (Fig. 125).



Fig. 125 MS SQL Management Studio. Database with the "Not Synchronizing" status

Remove this database from the secondary replica. In the context menu of this database (Fig. 126) select **Remove**.



Fig. 126 MS SQL Management Studio. Database context menu

In the opened dialog box (Fig. 127) check the box **Close existing** connections and click **OK**.

×	Delete Object			-	• *	¢		
Select a page	🔄 Script 🔻 📭 Help							
	Object to be deleted							
	Object Name	Object Type Database	O Status	s Message				
Connection								
Server: SRV2-2BOOK								
Connection: sa								
View connection properties								
Progress								
Ready	 Delete backup and r Close existing conner 	restore history info ections	rmation for data	abases				
					ОК	Ca	ancel]

Fig. 127 Delete Object dialog box
- 5. Next, you can recover the database on the main replica as usual the database does not participate in synchronization.
- 6. In the main DBMS replica, open the database context menu and select Tasks
 Restore Database... (Fig. 128).



Fig. 128 MS SQL Management Studio. Database context menu

In the opened dialog box (Fig. 129), on the **General** page set the switch to **From device** in the **Source for restore** unit. Click on the "..." button, to select a backup file for restoring.

Attention! If you are restoring a database not from a file, choose the respective options.

	Restore E	Database - ELMA3Prod		_ 🗆 X			
🛞 No backupset selected to be resto	red.						
Select a page	Script 🕞 📑 Help						
🚰 Files	Source						
Prions Options	 Database: 	EL MA3Prod					
	Device						
	S Device.						
	Database:			¥			
	Destination						
	Database:			~			
	Restore to:						
	Restore plan						
	Backup sets to restore:						
	Restore Name Component	Type Server Database	Position Hirst LSN Last LSN	Checkpoint LSN Full L			
Connection SRV1-2BOOK [BOOK\bookadmin]							
View connection properties							
Progress							
Ready							
			OK Canc	el Help			

Fig. 129 Restore Database dialog box

When you click on the "..." button, a dialog box opens (Fig. 130), where you need to select **File** in the **Backup media type** field and click **Add**.

3	Select backup devices	_ □
Specify the backup media	and its location for your restore operation.	
Backup media type:	File 🗸	
Backup media:		
		Add
		Remove
		Contents
	OK Car	acel Help

Fig. 130 Selecting a backup device

In the opened dialog box (Fig. 131), select a backup file.

Ũ	Locat	e Backup File - SRV1-2BOOK 📃 🗖 🗙
Backup File location:	C:\SRV12	
Embedded	Lockdown Manager Ilorer halysis Services elp Viewer QL Server DK 2.MSSQLSERVER 12.MSSQLSERVER SQL Backup Binn DATA >	 ASPState.bak ASPState_20170808133223.tm ELMA3Prod_bak ELMA3Prod_20170808140127.tm ElmaCache.bak ElmaCache_20170808143030.tm
File name:	ELMA3Prod.bak	Backup Files(*.bak;*.tm;*.log)
		OK Cancel

Fig. 131 Selecting a backup file

If you cannot find the required backup copy in the folder, set the file extension filter above the **OK** and **Cancel** buttons to **All Files**.

Confirm the changes by clicking **OK** (Fig. 130 and Fig. 131).

The database recovery wizard will run several checks and automatically suggest the appropriate database.

Attention! Make sure, that the suggested database is the one you intend to recover.

This is very important, since by default, the wizard suggests the database with the same name, as in the backup copy (Fig. 132), and that is not always what is required.

%		Restore [Database - ELMA	A3Prod			_ 🗆 X
🔔 A tail-log backup of the source d	atabase will be taken. \	/iew this setti	ng on the Options pa	age.			
Select a page	🔄 Script 🕞 📑 Hel	р					
🚰 General 🚰 Files							
Poptions	Source						
	O Database:		ELMA3Prod				×
	Oevice:		C:\SRV12\ELMA3P	rod.bak			
	Databa	ise:	ELMA3Prod				¥
	Destination						
	Database:	Database: ELMA3Prod					¥
	Restore to:		The last backup ta	ken (Tuesday, A	ugust 8, 2017 6	Timeline	
	Restore plan						
	Backup sets to n	estore:					
	Restore Name	Component	Туре	Server	Database	Position	First LSN L
	✓	Database	Full (Copy Only)	SRV1-2BOOK	ELMA3Prod	1	3100000019500037 3
Connection							
SRV1-2BOOK							
[BOOK\bookadmin]							
View connection properties							
Progress							
Done Done	<	ш					>
							Verity Backup Media
					ОК	Ca	ncel Help

Fig. 132 Restore Database dialog box. General page

After that open the **Files** page (Fig. 133) and make sure, that the database files are located where they are supposed to be. If necessary, check the box **Relocate all files to folder** and configure the respective settings.

5	R	estore Datab	ase - ELMA3Prod	_	D X
🛕 A tail-log backup of the source d	atabase will be taken. View	this setting on t	he Options page.		
Select a page	🔄 Script 🔹 📑 Help				
General Files Options	Restore database files	as			
	Relocate all files	to folder			
	Data file folder		C:\Program Files\Microsoft SQI	L Server\MSSQL12.MSSQLSEF	
	Log file folder		C:\Program Files\Microsoft SQL Server\MSSQL12.MSSQLSEF		
	Logical File Name	File Type	Original File Name	Restore As	
	ELMA3Prod	Rows Data	C:\Program Files\Microsoft S	C:\Program Files\Microsoft S	
	ELMA3Prod_log	Log	C:\Program Files\Microsoft S	C:\Program Files\Microsoft S	
Connection					
野 SRV1-2BOOK [BOOK\bookadmin]					
View connection properties					
Progress					
Oone Done					
			C	DK Cancel H	elp

Fig. 133 Restore Database dialog box. Files page

On the **Options** page (Fig. 134), check the boxes **Overwrite the existing database (WITH REPLACE)** and **Close existing connections to destination database**.

5	Restore Data	base - ELMA3Prod	- 🗆 X			
🛕 A tail-log backup of the source d	atabase will be taken. View this setting or	the Options page.				
Select a page	🔄 Script 👻 🚺 Help					
I General I Files I Options	Restore options Overwrite the existing databas Preserve the replication settin O	se (WITH REPLACE) gs (WITH KEEP_REPLICATION)				
	Restrict access to the restored	database (WITH RESTRICTED_USER)				
	Recovery state:	CVSRV12\ELMA2Brad Pallbacklindo 2017-08-10 19-17-04 k				
	Standby tile: C:\SKV12\ELMA3Prod_KOIlbackUndo_201/-08-10_19-17-04.bz Leave the database ready to use by rolling back uncommitted transactions. Additional transaction logs cannot be restored.					
	Tail-Log backup	schore				
	Eeave source database (WITH NORECOVERY)	in the restoring state				
	Backup file: Server connections	C:\SRV12\ELMA3Prod_LogBackup_2017-08-10_19-14-17.bak				
	 Close existing connections to 	destination database				
Connection	This may leave the destination	ation database in single-user mode.				
野 SRV1-2BOOK [BOOK\bookadmin]	Prompt Prompt before restoring each The Full-Text Upgrade ser the restored database.	backup ver property controls whether full-text indexes are imported, rebuilt	, or reset for			
View connection properties						
Progress						
Oone Done						
		OK Cancel	Help			

Fig. 134 Restore Database dialog box. Options page

Click **OK** and wait until recovery is complete, it may take a while. During the recovery, the dialog box will be displaying the recovery progress indicator.

Sometimes database servers may have limited disk space, while the database size is significant. For example, the hard drive size is 1 TB, and the database size is 600 GB. Recovering this database may take 600 GB more, i.e. 1.2 TB total.

It seems not logical, that the system takes into account the size of the current database, since it will be overwritten during recovery. In this case, the solution is to delete the database and recover it from grounds up or recover an empty database into it, which will significantly reduce its size.

After the recovery process is completed, you will see a respective dialog box (Fig. 135).



Fig. 135 Completing database recovery

 Now you need to add the database back to the availability group. To do so, in the main replica open AlwaysOn High Availability – Availability Groups – Availability Databases, open the context menu and select Add Database... (Fig. 136).



Fig. 136 MS SQL Management Studio. Availability Databases context menu

The wizard for adding a database to the availability group will open. Skip the first step of the wizard by clicking **Next**.

At the **Select Databases** step (Fig. 137), check the box next to the recovered database. It must meet all the requirements (see the **Status** column).



Fig. 137 Adding a database to the availability group. Step 2

To go to the next step of the wizard, click **Next**.

At the **Select Data Synchronization** step (Fig. 138) select **Full** and specify the network folder, available for all replicas. Search the required folder by clicking **Browse**...

After selecting the required folder, click **Next** to go to the next step of the wizard.



Fig. 138 Adding a database to the availability group. Step 3

At the next step (Fig. 139), connect to all the secondary replicas. To do so, click **Connect all**...

ñ <mark>i</mark>	Add Database to A	vailability Group - Group	_ 🗆 X			
Connect to Existing Secondary Replicas						
Introduction			🔞 Help			
Select Databases	Connect to all the exist	ing secondary replicas.				
Select Data Synchronization	Before the wizard can co	nfigure existing endpoints to grant them approp	riate permissions,			
Connect to Replicas	you must connect to all t	the existing secondary replicas.				
Validation	Server Instance	Connected As				
C	SRV2-2BOOK	BOOK\bookadmin	Connect			
Summary						
Results						
			Connect All			
		< Previous Nex	t > Cancel			

Fig. 139 Adding a database to the availability group. Step 4

To go to the next step of the wizard, click **Next**.

Complete the remaining steps of the wizard and click **Finish** (Fig. 140).

<u>n</u>	Add Database to Availability Group - Group	_ 0	x
Summary			
Introduction		(🕖 Help
Select Databases	Verify the choices made in this wizard.		
Select Data Synchronization	Click Finish to perform the following actions:		
Connect to Replicas			
Validation	Databases		
Summary	Initial data synchronization: Full		
Results	Im Backup location: \\Srv1-2book\srv12		
		Scrip	ıt ▼
	< Previous Finish	Ca	ncel

Fig. 140 Adding a database to the availability group. Step 6

Once the wizard completed its work, a respective notification will be displayed (Fig. 141), close the wizard.

ñ	Add Database to Availability Group - Group	– – ×
Results		
Introduction		🔞 Help
Select Databases	The universal according to the discovery failly	
Select Data Synchronization	I ne wizard completed successfully.	
Connect to Replicas	Summary:	
Validation	Name	Result
Summary	Creating a full backup for [5] MA2Dread	Success
Results	Creating a full backup for ELMASPIGE .	Success
	Restoring LLIVIASPIOL OF SKV2-2000K .	Success
	Bestoring 'FLMA3Prod' log on 'SRV2-2BOOK'	Success
	Icitizing 'El MA3Prod' to availability group 'Group' on 'SRV2-2BOOK'	Success
		<u>buccess</u>
	< Previous Next >	Close
	< PTEVIOUS INEXL >	Close

Fig. 141 Adding a database to the availability group. Step 7

8. Open the list of the secondary replica databases. For a while, the recovered database will be synchronizing and will not be available.

This process may take up to several hours. After that, the database status will automatically change to **Synchronized** (Fig. 142) and the database will become accessible.



Fig. 142 MS SQL Management Studio. Synchronized database

5.1.6. Restoring a database from the transaction log / rolling back the state to specific time

It may be necessary to return the database state to specific time, e.g. before publishing a certain object, or executing a request to delete certain important data. It is highly recommended that you <u>back up the database</u> manually as described in section 5.1.5 before performing potentially harmful operations and making significant changes.

Since the database works with the full recovery model, it is possible to restore the state of any selected time, if there are backup files. In addition, it is possible to restore using TailLog – the part of the transaction log, saved at the current moment and not used for creating backup copies.

Restoring a database implies removing it from the AlwaysOn availability group and closing all the connections. You must stop ELMA while carrying out these operations. Depending on the database size and connection speed, this process may take up to 15 minutes.

1. Make sure, that ELMA is stopped. In case of a farm, you must stop the ELMA application pool in the IIS Manager on each server.

2. <u>Back up the database</u> manually. This may come in handy, if the database is not restored to the required data in the first attempt.

When restoring with TailLog, MS SQL automatically backs up the log, which may be lost (it is recommended that you create the backup copy manually).

3. First, stop data movement in the AlwaysOn High Availability.

To do so, in MS SQL Management Studio go to **AlwaysOn High Availability** – **Availability Groups**, select the required availability group; open **Availability Databases**, and select the database you need to restore and remove it from the availability group (Fig. 143).



Fig. 143 MS SQL Management Studio. Availability group context menu

In the appeared dialog box, click **OK**.

4. In MS SQL Management Studio, open the context menu of the required database and select **Tasks – Restore – Database...** (Fig. 144).

			Solution1 - Microsoft SQL Server Manageme			_ 🗆 X
File Edit View Projec						
🛅 • 🗃 • 💕 🗐 🥔	🔔 New Query 📑 📸	1 1	2 1 1 1 1 1 - マージ・マージ 2 1 1 1 1			* 🗠 🗄
Object Explorer			▼ Ψ ×			- # ×
Connect - 🔢 🖳 🔳						
😑 🐻 SRV1-2BOOK (SQI	Server 12.0.2000 - BOOK	bookadmii	n)			
🖃 🧰 Databases						
🕀 🧰 System Da	tabases					
	Svnchronized)					
ELMA3Pro						
🕀 🧻 ElmaQi	New Database					
Security Security Server Ob	New Query					
Replication	Script Database as	•		-		
😑 🚞 AlwaysOr	Tasks	•	Detach			
E Availat	Policies		Take Offline			
H 🖿	Facets		Bring Online			
	Start PowerShell		Shrink •			
E 🚞	Reports		Back Up		-	
🗉 🧰 Managem	Rename		Restore >	Database]	
R SQL Server	Delete		Mirror	Files and Filegroups		
	Refresh		Launch Database Mirroring Monitor			
	Properties		Ship Transaction Logs	Page		
			Generate Scripts			
			Extract Data-tier Application			
			Deploy Database to Windows Azure SQL Database			
			Deploy Database to a Windows Azure VM			
			Export Data-tier Application			
			Register as Data-tier Application			
			Upgrade Data-tier Application			
			Import Data			
			Export Data			
Ready			Copy Database			

Fig. 144 MS SQL Management Studio. Database context menu

In the opened dialog box, on the **General** page (Fig. 145), select **Database** in the **Source** unit and select the required database.

A tail-log backup of the source of the sourc	database will be	taken. View this sett	ing on the Op	tions page.				
Select a page	Script 🝷	Help						
Files	Source -							
P Options	a D-1		-					
	• Dat	abase:	ELMA3Pro	d				~
	O Dev	/ice:						
	Database:							
	Destinatio	on						
	Databa	ase:						V
	Restor	e to:	The last backup taken (Thursday, August 10, 2017 7:29:23 F					imeline
	Restore p	lan						
	Backup	sets to restore:						
	Restore	Name		Component	Туре	Server	Database	Position
	V	ELMA3Prod-Full D	atabase Ba	Database	Full	SRV1-2BO	ELMA3Pr	2
	V	ELMA3Prod-Full D	atabase Ba	Log	Transaction	SRV1-2BO	ELMA3Pr	3
Connection								
SRV1-2BOOK								
IDOOID L. L. L. L. L.								
[BOOK\bookadmin]								
[BOOK\bookadmin]								
[BOOK\bookadmin]								
[BOOK\bookadmin] View connection properties Progress								
View connection properties Progress Ready		Ш					Verify Bac	> kup Media

Fig. 145 Restore Database dialog box. General page

In the **Destination** unit, make sure that the required database is selected in the **Database** field and click **Timeline**...

In the appeared dialog box (Fig. 146), select **Specific date and time**, and specify the required date and time. You can select time on the timeline. Here you can also see all the available backup copies.

()		Backup Timeline: ELMA3Prod	x
🕕 Ready			
Restore to			
C Last backup take	en		
 Specific date and 	d time		
Date:	8/10/2017]	
Time:	7:24:50 PM		
Timeline Interval:	Day	Y	
<	0:00	6.00 12:00 18:00	>
Legend -			
	Full Database Backup	Transaction Log Backup	
∇	Differential Database Backup	Tail-Log	
		OK Cancel Help	

Fig. 146 Backup Timeline dialog box

After selecting the required date and time for restoring the database state, click \mathbf{OK} .

In the **Restore Database** dialog box, open the **Options** page (Fig. 147) and check the box **Overwrite the existing database (WITH REPLACE)** in the **Restore options** unit.

In the **Server connections** unit, check the **Close existing connections to destination database**. It is necessary if the ELMA application pool, copying in the availability group or another user are connected to the database.



Fig. 147 Restore Database dialog box. Options page

5. Once the database is restored, add it back to the availability group (Fig. 136). You will also have to delete the database from the secondary replica.

5.2. Maintaining ELMA

5.2.1. Configuring automatic system diagnostics

This step is not obligatory; however, it is recommended that you follow through it for further operation and system maintenance.

You can configure system diagnostics parameters in ELMA Web Application, in **Administration – System – System Diagnostics** (Fig. 148).



Fig. 148 Administration – System – System Diagnostics

To edit the system diagnostics settings (Fig. 149) click on the \checkmark icon, next to the unit name.

	System Diagnostics Settings	×
Diagnostics enabled/disabled Generate reports automatically Report Generation Period	Yes No Yes No Every day Yes from 08:00 PM V	
Statistics Reset Period	Every 24 hours after first reports export	
Log detalization level Use performance counters	Errors only Ves No	
	Sa	ve Cancel

Fig. 149 System diagnostics settings

The **Generate reports automatically** parameter activates automatic generation or reports on ELMA performance with the defined periodicity. Specify the period for generating reports, first report generation time, which will be used as the start point for the period, and the statistics reset period.

The following parameters are recommended:

- **Report Generation Period** Every day, starting at 20:00. Specify the time two hours after the end of the business hours.
- **Statistics Reset Period** Every 24 hours after first reports export. This way, statistics will be gathered every day.

Configure other settings as necessary. To save the changes, click **Save**.

5.2.2. Gathering ELMA error-logs from several servers

Despite the possibility to configure logs from all the servers to be saved in a shared folder while specifying the server name, we discourage doing so for systems that work under high load, since it may increase the load on the network, which is one of the essential parts of the system.

It is recommended that you provide the Administrator account with shared access to the Web folder of ELMA (C:\\ELMA3-Enterprise\Web) on each server (access to read will be required to gather logs).

Attention! Any changes you make in the Web folder may become the reason to restart the system on a particular server. For this reason, it is

inadvisable to grant permissions to the employees, who do not need them.

This way, the administrator can quickly gather log files from all the servers by accessing the following folders:

- \\SRV12-1\Web\Logs\Error
- \\SRV12-2\Web\Logs\Error

5.2.3. Restarting ELMA farm

Restarting ELMA farm may be required in different situations. For example, for database and server maintenance.

It is important to understand that a farm involves several ELMA servers and restarting it means stopping each particular server and then starting it.

There may be three situations:

- Restarting servers with full stop of the farm (section 5.2.3.1);
- Restarting servers during operation (section 5.2.3.2);
- Restarting servers to import objects or update (sections 5.2.4 5.2.6).

5.2.3.1 Restarting servers with full stop of the farm

This restart type means that the farm will be unavailable to the users during the restart.

1. Open IIS Manager and stop ELMA pool on each server (Fig. 150).

v j		Internet	t Information	Services (IIS) N	/lanager		_ D X
🛞 👔 🕨 SRV2-2BOOK 🔸 Application Pools							
File View Help							
Connections Start Page Start	Application	on Poo	DIS age the list of apne or more appl Go ~ ↓ Shoo .NET CLR V v2.0 v4.0 v4.0 v4.0 v4.0 v4.0 v4.0 v4.0 v4.0	plication pools on cations, and provid w All Group by: Integrated Classic Integrated Classic Classic Integrated Integrated Integrated	the server. Application de isolation among diff No Grouping Identity ApplicationPoolld ApplicationPoolld ApplicationPoolld ApplicationPoolld book\bookadmin	pools are associated ferent applications.	Actions Add Application Pool Set Application Pool Defaults Application Pool Tasks Start Stop Recycle Edit Application Pool Basic Settings Recycling Advanced Settings Rename Remove View Applications Help
Ready						🛀 (SRV)	2-2BOOK:8172 as book\bookadmin) 🏭 🗄

Fig. 150 IIS Manager

2. Next, you can restart the cache cluster. It is recommended that you do that periodically. You can do that during the system maintenance.

To stop the cache cluster on any application server (e.g. **SRV12-1**) start the **PowerShell** console as the administrator. Go to **Start -> All Programs -> AppFabric for Windows Server -> Caching Administration Windows PowerShell** (Fig. 76).

In the command prompt, execute the "stop-cachecluster" command. You will see a progress bar and the caching cluster stop result (Fig. 151).



Fig. 151 Windows PowerShell. Stopping the caching cluster

After stopping the caching cluster, you can immediately start it with the "start-cachecluster" command (Fig. 152).



Fig. 152 Windows PowerShell. Starting the caching cluster

3. Start ELMA pool on each server one by one.

Start the pool on one of the servers. Open ELMA Web Application on this server and wait until it has been started.

Attention! During restart, do not try to open ELMA Web Application using the controller address, it will return an error until at least one server is started.

4. Repeat step 3 for the next server.

Although there is a mechanism that automatically starts all servers one by one ("Waiting for another ELMA server to start"), we recommend that you control this process yourself, so that you could timely react to possible issues.

5. As the result, all servers must be started.

5.2.3.2 *Restarting a server without stopping the farm*

In case of an emergency, you may need to partially restart the farm – specific servers or all servers but without stopping the farm.

Attention! If the situation allows waiting till the end of the business day or restarting with full stop (see выше), restarting without stopping the farm is not recommended.

The idea of this approach is in "disconnecting" a server from the farm and restarting it, while the other servers continue working in the farm.

- 1. Open IIS Manager on the farm controller (93.158.134.30 WFCONTROLLER).
- 2. Go to **Server Farms**; find the name of your farm (in this case, **ELMA3**) and open **Servers** (Fig. 153). Here you will see the list of all application servers, included in the farm, and their statuses.

🧃 Диспетчер служб IIS 📃			
€ SRV12-1 → Se	rver Farms → ELMA3 → Servers	►	🖸 🛛 🟠 🕡 -
Файл Режим Справка			
Подключения			Действия
Q- 🔒 🖄 😥	Servers		Add Server
 Начальная страница SRV12-1 (ELEWISE) Пулы приложений 	Address SRV12-2	Status Online	Remove Server Take Server Offline
Caŭtui Server Farms ELMA3 Servers	ЗКV12-1 Просмотр возможностей	росмотр содержимого	Connect to Server
Готовность			€ <u>1.</u> :

Fig. 153 IIS Manager

3. Select the server you need to restart (e.g. SRV12-1), and click **Take Server Offline** in the right menu. In the opened dialog box (Fig. 154), click **Yes**.



Fig. 154 "Take Server Offline" dialog box

This way you will "disconnect" the server from the farm, and it will no longer receive requests from users, while the server will remain enabled.

Attention! When disconnecting a server from a farm, make sure, that there are still active servers in the farm. If you disable the only online or available (on the "Monitoring and Management" panel) server, users will receive an error when accessing the Web Application.

4. After that, you can perform any actions with the SRV12-1 server, including restarting ELMA pool or even restarting the operating system.

Attention! Do not stop the caching cluster under any circumstances – it is required for all the servers at the same time and stopping it will restart all the other servers.

- 5. Once the server is started, go to **Server Farms**, find your farm (in this case, **ELMA3**) and open **Servers** (Fig. 153).
- 6. Select the SRV12-1 server and click **Bring Server Online** in the right menu. After that, the server will continue receiving requests.
- 7. If necessary, repeat all the steps for other servers.

5.2.4. Importing configuration via ELMA Designer

Importing a configuration to a farm has peculiarities, related to object publishing.

- 1. First, stop all the ELMA application servers except for the one you will import to.
- 2. Connect ELMA Designer to this server and perform import (as usual).

If the imported configuration contains metadata that requires restart (objects, documents, global modules, etc.), then confirm restart at the import step that will suggest restarting. Other servers were stopped beforehand. 3. Once the import is complete, start all the ELMA servers.

5.2.5. Installing and updating packages/components

Installing and updating modules via the package manager has peculiarities. When installing via web interface, the system checks the package compatibility, installs the module and makes an entry in the database. In case of the farm, the procedure is following:

- 1. Copy the package to install/update to the **Packages** folder on each server, located in the ELMA folder, e.g. **C:\\ELMA3-Enterprise\Packages**.
- 2. Stop all the ELMA servers except for one (e.g. SRV12-1).
- 3. Open ELMA Web Application on the SRV12-1 server and go to **Administration System Components** (Fig. 155).



Fig. 155 ELMA Web Application. Administration - System - Components

Click **Install Components** or **Update Components** in the top menu. In the opened dialog box, select the required components, click **Install** and wait until the installation is complete. It may take a while. During this process, the ELMA server will be restarted.

You can monitor the components installation/update progress using the address of ELMA Web Application that will be temporarily replaced with the web part of the package manager.

If you open IIS Manager, you can see that the website path has changed. After the package manager completed its work, path will change back to the ELMA website path.

4. Once the SRV12-1 server is started after package installation/update, proceed with installing/updating packages on the other servers in the console mode.

On each of the remaining servers, open the command prompt as the administrator and run

\PackageManager\EleWise.ELMA.Packaging.Console.exe with a parameter – name of your package and installation key in Web (otherwise it will also be installed to the Designer).

The installation command will look as follows:

EleWise.ELMA.Packaging.Console.exe install EleWise.ELMA.Project c Web

Here is an example of the full installation command:

C:\ELMA3-

Enterprise\PackageManager\EleWise.ELMA.Packaging.Console.exe install EleWise.ELMA.Project -c Web

Note, that the package name is specified without **.Web** and version (Fig. 156).



Fig. 156 Command prompt

If you receive an error, make sure you have started the console as the Administrator.

- 5. Start the ELMA server in the IIS Manager.
- Open Web Application of the started server, go to Administration System
 Components and make sure, that the component is displayed in the list and its version corresponds to the installed one.

Installation to this server is complete. Apply steps 4-6 to the next stopped server. As the result, all the ELMA servers must be started.

5.2.6. Updating ELMA farm

Updating ELMA in a farm is not much different from regular update. Take into account, that all the servers must be stopped before updating, and started only after updating ELMA on each server.

To update ELMA farm, follow this procedure.

- 1. Stop ELMA pools on each server.
- 2. Install system updates on each server as usual.
- 3. Restart the caching cluster.

To stop the caching cluster on any application server (e.g. 93.158.134.3 – SRV12-1) start the **PowerShell** console as the Administrator. Go to **Start -> All Programs -> AppFabric for Windows Server -> Caching Administration Windows PowerShell** (Fig. 76).

In the command prompt run the "stop-cachecluster" command. You will see the stopping progress bar and the result (Fig. 151).

After stopping the caching cluster, you can start it with the "start-cachecluster" command (Fig. 152).

4. Next, start ELMA pool on each server one by one.

Start the pool on one of the servers. Open ELMA Web Application on this server and wait until it is started.

5. Repeat step 4 for the next server. As the result, all the servers must be started and work with the new ELMA version.

5.3. Maintaining Application Servers

Application servers rarely require any maintenance; however, there are several rules.

- 1. Monitor CPU, memory and network usage on the servers, especially in case of peak load.
- 2. If CPU or memory usage exceeds 80% during peaks, you should start increasing capacity. Usually it is topical after the system load is balanced and users' work is even.
- 3. Monitor empty disk space, and if necessary clear it. Don't forget to <u>disable</u> <u>IIS logging</u>, if it is not required for trouble shooting.
- 4. If the **Windows\Temp** folder grows, you can clear it when ELMA is offline.

5.4. Maintaining File Storage

These are the main recommendations for maintaining the file storage:

- 1. Allocate a hard drive with plenty of disc space.
- 2. Make sure that there is always free space absence of free space may cause the system or some functions to slow down or stop.
- 3. Do not enable antimalware scanners. It will significantly slow down work with files. If necessary, schedule daily scanning for nighttime (after 2:00 AM).
- 4. Do not try to edit or change files in the **Files** folder ELMA checks hashsums of files, uploaded via the system.

5.5. Maintaining Controller Server

The controller server is least demanding in terms of resources and maintenance, however there are several recommendations:

- 1. If CPU or memory usage exceeds 80% during peaks, you should start increasing capacity. Usually it is topical after the system load is balanced and users' work is even.
- 2. Monitor empty disk space, and if necessary clear it.

The controller uses very little disk space (only for some logs), but if the disk runs out of free space, the response time will increase by several times.

3. <u>Disable IIS logging</u>, if it is not required for trouble shooting. Practice shows, that it is the only issue with free space on the controller.

Chapter 6. Possible Issues and Trouble Shooting

This chapter describes possible issues you may face when installing, configuring, operating and maintaining ELMA web farm with an MS SQL AlwaysOn cluster. If you have faced an issue, which is not described in this chapter, try searching on the Internet, since most issues are related not to ELMA, but to other components (such as .NET Framework, VMWare, MS SQL Server, ASP.Net).

6.1. Recommendations on VM Resource Reservation

If the servers for deploying the system (controller, application servers, DBMS server, file server) are virtual machines, pay attention to resource allocation.

The nature of virtual machines is so, that you can allocate 128 GB of RAM and 28 CPU cores that a user will see in the operating system, while placing all that on an overloaded or "outdated" host. In this case, the 28 CPU cores and 128 GB RAM in fact will be very slow. If such a situation occurs, look for the reasons of low performance on the host or VM controller.

- 1. First, make sure that the VM host server has enough resources.
- 2. Reserve CPU and RAM resources for virtual machines. Reserve maximum of resources (within the recommended system requirements), especially before putting the system under the maximum load, when there are no exact data.
- 3. Make sure that the memory allocation on the VM controller is not in the **ballooned** or **swapped** mode.
- 4. Check total host server load. Situations may occur when the host load is high enough, and resources simply will not be allocated with sufficient speed and in sufficient amount.

6.2. Solving Issues with MS SQL Server Installation

Default instance name already exists

Most likely, the previous installation completed with an error and you need to delete it if you already have an operational MS SQL Server.

- 1. If an MS SQL Server already exists, you don't need to install it again it is ready for creating databases.
- 2. If the previous installation completed with an error, it would be better to delete the installed components and reinstall it from scratch.

6.3. Solving Issues with Logging in to MS SQL Server

No MS SQL Management Studio

You can download this component from the Microsoft website. Later on, we recommend that you download and install **MS SQL Server with advanced tools** distribution packages, which already include this component.

Impossible to specify an LDAP account

Most likely, the server is not included in the domain. This is an obligatory requirement for the farm and the cluster. Contact the system administrator to include the server to the domain.

You can do it yourself, if you have an account with the required permissions:

- 1. Go to **Start -> Computer** and select **Manage** in the context menu.
- 2. In the opened window, select the **Local Server** tab and click **Domain**.
- 3. In the appeared dialog box click **Change...** on the **Computer Name** tab (Fig. 157) and log in to the domain.

System Properties				
Computer Name Hardware Advanced Remote				
Windows uses on the network	the following informa	ation to identify yo	ur computer	
Computer <u>d</u> escription:				
	For example: "IIS P "Accounting Serve	roduction Server' r''.	' or	
Full computer name:	en-demo			
Workgroup:	WORKGROUP			
To rename this computer workgroup, click Change	or change its domair	n or	<u>Change</u>	
	OK	Cancel	Apply	

Fig. 157 System properties dialog box

6.4. Solving Issues with Creating ASPState databases

Database with this name already exists

Stop all the ELMA servers, delete the ASPState database and try creating again.

After restarting DBMS, ELMA returns an error that objects are missing in ASPState

Most likely, the ASPState database was created with incorrect parameters, specifically, with saving the structure to RAM, and not as tables.

Delete the ASPState database and create it following the instructions in 3.1.5.

6.5. Solving Issues with AppFabric Installation

Cannot start AppFabric installation (error)

Enable automatic update in the system settings. Without it, installation will not start.

It does not matter if you have Internet connection to receive updates. During the installation, the parameters in the Control Panels themselves are checked.

Port is occupied

If you install AppFabric normally, for the first time, the port should not be occupied. Make sure, that you have not installed AppFabric earlier. If you have an installed AppFabric, uninstall it.

6.6. Solving Issues with Configuring Controller Server

During the installation, the URL Rewrite component has not been installed or when creating the farm, automatic redirect settings were rejected

First, install URL Rewrite; without it, it is impossible to distribute requests among application servers.

Second, open the IIS Manager and select **URL Rewrite** on the server main page in the **IIS** unit (Fig. 158).



Fig. 158 IIS Manager. URL Rewrite

Create the following rule with a request filtering condition (Fig. 159):

Match URL		
Requested URL:	U <u>s</u> ing:	Ŭ
Matches the Pattern	Wildcards	•
Pa <u>t</u> tern:		
*		Test <u>p</u> attern
Ignore case		



And a rule with an action (Fig. 160):

Action		۲
Action type:		
Route to Server Fa	rm 🖌	
Action Properties		
Scheme:	Server farm:	Path:
http:// V	ELMA3 V	/{R:0}
✓ Stop processing	of subsequent rules	

Fig. 160 Configuring URL rewrite

These settings are configured as part of one rule.

Web farm cannot get access to the Internet during installation/configuration via proxy.

When installing or configuring a farm/farm controller, IIS service or one of dependent components may require temporary access to the Internet.

In this case, IIS does not inherit custom proxy server settings in the web browser or Control Panel.

To configure Internet access via a proxy server for IIS, run the following command in the command prompt as the Administrator:

```
C:\Windows\System32\inetsrv\appcmd.exe set config -section:webFarms /[name='Farm_name'].defaultProxy.enabled:"True"
```

```
/[name='Farm_name'].defaultProxy.proxyaddress:"Proxy_Address"
/[name='Farm_name'].defaultProxy.userName:"User"
/[name='Farm_name'].defaultProxy.password:"Password" /commit:apphost
```

In this example, the command looks like this:

C:\Windows\System32\inetsrv\appcmd.exe set config -section:webFarms

```
/[name='ELMA3'].defaultProxy.enabled:"True"
```

```
/[name='ELMA3'].defaultProxy.proxyaddress:"93.158.134.321:8888"
```

```
/[name='ELMA3'].defaultProxy.userName:"ELMAAdmin"
```

/[name='ELMA3'].defaultProxy.password:"12345678" /commit:apphost
6.7. Solving Issues with Failover Cluster Installation

Check, if the current machine is a failover cluster node

 Open SQL Server Configuration Manager (Fig. 15), go to SQL Server Services, select the required instance of SQL Server (MSSQLSERVER) and open its Properties (Fig. 161).

-		figuration Ma				_ 🗆 X
File Action View Help Image: Second s						
SQL Server Configuration Manager (Local) SQL Server Services SQL Server Network Configuration (32bit)	Name SQL Server Browser SQL Server Integration Services 12.0	State Stopped Running	Start Mode Other (Boot, Syste Automatic	Log On As NT AUTHORITY\LOCAL NT Service\MsDtsServer	Process ID 0 1368	Service Type
▷ 큰 SQL Native Client 11.0 Configuration (32bit) ▷ 보 SQL Server Network Configuration ▷ 큰 SQL Native Client 11.0 Configuration	SQL Server (MSSQL SESUED) SQL Server Agent SQL Full-text Filter Resume Restart Properties	Penning pped nning	Automatic Manual Manual	BOOK\bookadmin BOOK\bookadmin NT Service\MSSQLFDLa	1684 0 4072	SQL Server SQL Agent
Opens the properties dialog box for the current select	ion.					

Fig. 161 SQL Server Configuration Manager. SQL Server instance context menu

 In the opened dialog box, go to the AlwaysOn High Availability tab. The Windows failover cluster name field (Fig. 162) will display the status of the current machine.

If it is impossible to select the **Enable AlwaysOn Availability Groups** box, close this dialog box and follow the steps described in 3.2.5.

SQL Ser	ver (MS	SQLSERVER) Propertie	es ?	x				
Log On	S	TREAM							
AlwaysOn High Availability Startup Parameters Advanced									
Windows failover cluste	er name:								
srv2fc									
Enable AlwaysOn A	vailability (Groups							
Allow this instance o availability and disas	f SQL Serv	ver to use availa ery.	bility groups fo	or high					
OK	•	Cancel	Apply		leip				

Fig. 162 SQL Server (MSSQLSERVER) Properties

If there is no such user, you need to create it. To do so, open the Server Manager and go to **Configuration – Local Users – Groups**. Open the context menu of the Administrators group and click **Add group...** In the opened dialog box, click **Add...** on the **Member of** tab (Fig. 163).

	Administrator Properties ? X									
Remote control	Remote De	sktop Servic	es Profile	Dial-i	n					
General Memb	er Of Prof	file Er	vironment	Sessio	Ins					
Member of: Administrators					٦					
Aremote Desktop	Users									
Add F	lemove use	anges to a u not effective er logs on.	ser's group me e until the next	mbership time the						
	<u>к</u>		Arabi	List						
0		ncel	нрру	Hei	P					

Fig. 163 Administrator Properties

In the opened dialog box (Fig. 164), enter the name of the required user and click **OK**.

Select Groups	×
Select this object type:	
Groups	Object Types
From this location:	
SRV2-2BOOK	Locations
Enter the object names to select (<u>examples</u>):	
Remote	Check Names
Advanced C	DK Cancel

Fig. 164 Selecting a group

6.8. Solving Issues with Creating MS SQL AlwaysOn Availability Group

Issues with creating an availability group are mostly related to incorrect order of actions and not installed components.

6.8.1. The computer is not a failover cluster node

Check, if the current machine is a failover cluster node. To do so:

- Open the SQL Server configuration manager (Fig. 15), go to SQL Server Services, select the required SQL Server (MSSQLSERVER) instance and open its Properties (Fig. 161).
- 2. In the opened dialog box (Fig. 162), go to the **AlwaysOn High Availability** tab. The **Windows failover cluster name** field will display the status of the current machine.

If it is impossible to check the box **Enable AlwaysOn availability groups**, and follow the steps described in **Ошибка! Источник ссылки не найден.**

6.8.2. Error opening the failover cluster manager

Open the Server Manager, go to **Dashboard**, click tools and select **Failover Cluster Manager** (Fig. 23). If an error occurred (Fig. 24), log in to the system as a domain user. Note, that the server must be included in the domain.

If there is no such user, you need to create it or have the system administrator create it.

If you have sufficient permissions in the domain, you can add an account yourself. To learn more, see section 6.7.

6.8.3. Cannot log in to MS SQL Server with a domain account or via single sign on

Create a login in the MS SQL Server Management Studio. To do so:

- 1. Log in to MS SQL Management Studio under the current account (e.g. **sa**) or the one specified during installation (by default, single sign on under the same user).
- In Security Logins open the context menu and click New Login... (Fig. 12).

- 3. In the opened dialog box, go to the **General** tab and specify the domain and the name of the required users (Fig. 12).
- 4. On the **Server Roles** tab (Fig. 14), check all the available boxes and click **OK.**

Not all the permissions may be required when working with the system; however, they may be required during installation, deployment and maintenance configuration.

After that, you can log in to MS SQL Management Studio under the created account.

6.9. Solving Issues with Starting ELMA

Attention! Note, that if the system works properly and during a planned restart (update, configuration import, maintenance) you see an error, try restarting IIS pool.

The causes of most start errors are temporary. For example:

- Designer is running and being used the configuration file was busy during the start;
- Antivirus or another monitor temporary blocked access to one of the configuration files;
- During the start, a request with blocking was executed in the database.

Error initializing ELM	MA configuration
90 %	6
<u>View full des</u>	scription
	ELMA 3.10.8.32106 R.1a2f21ed9cb48

Fig. 165 ELMA Web Application. Start error

In any case, first, open the full description of the error and try restarting ELMA pool in IIS Manager.

6.9.1. No access to the ConfigurationModel.dll file

This error may have different descriptions, stating that there is no access to EleWise.ELMA.DynamicModel.dll, ConfigurationModel.dll libraries.

First, close all the Designers, connected to this server. It is very likely, that something is opened in the Designer, and, therefore, the file is busy.

The second common cause of this error is that files are being scanned by anti-virus software. If possible, stop scanning and try again. Note that scanning may get in the way of starting, if it is active on both the ELMA application servers and the file storage.

Usually, if the error description specifies the file, which could not be accessed, follow these steps:

1. Open Windows Task Manager, go to the **Performance** tab and click **Resource Monitor**... (Fig. 166).



Fig. 166 Windows Task Manager. Performance tab

2. In the opened dialog box, go to the **Disk** tab and expand the **Disk Activity** panel (Fig. 167).

🔞 Resource Mon	itor										
Eile Monitor Help)										
Overview CPU	- Memory	y Disk Ne	twork								
Processes with D	lisk Activity	y						▼ ▲	•	Views 👻	\square
Disk Activity	l	0 KB/sec Disk	1/0		📕 21% H	ighest Activ	re Time		Disk	100 KB/sec	1
Image	PID	File	Read (Write	Total (+	Respo				
System	4	C:\ELMA3	0	702	702	Normal	87				
System	4	C:\ELMA3	0	234	234	Normal	87			illini il i ilini	
System	4	C:\Windo	0	128	128	Normal	71			HALA LOAN	
System	4	C:\Windo	0	95	95	Normal	71			- <u>1988 ar a</u> n	
postgres.exe	1292	C:\ELMA3	0	543	543	Normal	58		60 Seconds		
System	4	C:\Users\	0	1 024	1 024	Normal	53		Disk 0 (C:) Oue	ue Lenath 0.01	- I
System	4	C:\ELMA3	0	1 170	1 170	Normal	49				
System	4	C:\ELMA3	0	1 170	1 170	Normal	49				
System	4	C:\ELMA3	0	862	862	Normal	44				
System	4	C:\ELMA3	0	647	647	Normal	44	-1		<u>₩16 ↓ </u>	
System	4	CUELWAD	0	/21	/21	Normal	лл			18.4 1 8	
Storage								•	N N I V	L W L AK	
										0	7
								-			ľ

Fig. 167 Resource monitor. Disk tab

- 3. In the **File** column, find the blocked file and identify, which process is using it.
- 4. Stop the process close the applications, stop scanning.
- 5. Start the ELMA pool in IIS.
 - 6.9.2. Connection with an MS SQL Server mirror instance with the MultiSubnetFailover parameter is not supported

Ошибка при запуске системы



Fig. 168 ELMA Web Application. Start error

This error (Fig. 168) is caused by incorrect database connection settings; specifically a path to a replica was specified, instead of a failover cluster.

To eliminate this error, follow these steps:

- 1. Stop ELMA pool in IIS Manager.
- 2. Open the configuration file $\left| \right|$ (in this case, ELMAConfig\ELMAShared\Config\configuration.config).
- 3. Find the **<connectionStrings>** line and check the database connection string. In this case, connection must be established to the failover cluster, to the availability group listener – SRV12DBLst, not to its replicas: DBCLUSTERTEST01, DBCLUSTERTEST02.
- 4. Correct the connection string and start the ELMA pool in IIS Manager.

6.9.3. Target database "ELMA3" is included in the availability group and currently is not available for requests

Ошибка при запуске системы

*EleWise.ELMA.Runtime.Exceptions.ConfigurationInitializeException: Ошибка инициализации конфигурации ELMA> System.InvalidOperationException: Не удалось подключиться к базе данных > System.Data.SqlLient.SqlException: Целевая база данных "ELMA3" участвует в группе доступности и в настоящее время недоступна для запросов. Перемещение данных лемо реплике доступности и включен доступности и участвует в группе доступности и в настоящее время недоступна для запросов. Перемещение данных лемо нескольким вторичным репликам доступности в группе. Дополнительные сведения см. в описании инструкции ALTER AVAILABILITY GROUP в электронной документации по SQL Server. в System.Data.ProviderBase.DbConnectionPool.TryGetConnection owningObject, UInt32 waitForMultipleObjectsTimeout, Boolean allowCreate, Boolean onlyOneCheckConnection, DbConnectionPool.TryGetConnectionPool.TryGetConnection,
a System Data ProviderBase DbConnectionPool TryGetConnection(DbConnection owningObject, TaskCompletionSource') retry, DbConnectionOptions userOptions, DbConnectionInternal& connection)
a System Data ProviderBase DbConnectionFactory, TryGetConnection(DbConnection owningConnection, TaskCompletionSource'1 retry, DbConnectionOptions userOptions, DbConnectionInternal old/connection. DbConnectionInternalk.connection/
s Sustem Data DeputideRare DeConactionInternal InvOperConnectionInternal/DbConnection_DbConnectionEactory_connectionEactory_TackCompletionSource`1_petry
B System Date route assubilities has in spenchimection internal (becomection date connection, becomection actory connection actory, has completions)
Decommentations/priors asset options/
s System Data SalConnection TryUnan(TacKompactonSource') netry
s System Data salliant salconection (noncontinuous)
s Flaking ElMA Extensions MSSOL MSSOL Exonvider aVaTNWDaS3DCVueu0/Object)
B Elewice FINA Extensions MSSOL MSSOL Provider InitInternal()
B EleWise, ELMA, Extensions, MSSOL, MSSOLProvider, InitInternal()
B EleWise. ELMA. Extensions. MSSOL.MSSOLProvider.6288hDbHfMk12es5rCW(Object)
B EleWise.ELMA.Extensions.MSSQL.MSSQLProvider.CreateTransformationProvider()
B EleWise.ELMA.Runtime.RuntimeApplicationctor(String configurationFileName, Type sessionProviderType, String[] assembiesPath, Dictionary'2 extenderParams)
Конец трассировки внутреннего стека исключений
B EleWise.ELMA.Runtime.RuntimeApplicationctor(String configurationFileName, Type sessionProviderType, String[] assembiesPath, Dictionary'2 extenderParams)
B EleWise.ELMA.Runtime.RuntimeApplicationctor(String configurationFileName, Type sessionProviderType, String[] assembiesPath)
в EleWise.ELMA.BPM.Mvc.Application.Orchard.ELMAEnviromentStarter.RegisterComponents(Object componentManager)
B EleWise.ELMA.BPM.Mvc.Application.Orchard.ELMAEnviromentStarter.wxSM8dxaDgDxkIKFaE(Object)
B EleWise.ELMA.BPM.Mvc.Application.Orchard.ELMAEnviromentStarter.StartApplicationInThread()
Ошибка инициализации конфигурации ELMA
EleWise.ELMA.SDK
B EleWise.ELMA.Runtime.RuntimeApplicationctor(String configurationFileName, Type sessionProviderType, String] assembiesPath, Dictionary'2 extenderParams)
B EleWise.ELMA.Runtime.RuntimeApplicationctor(String configurationFileName, Type sessionProviderType, String[] assemblesPath)
B EleWise.ELMA.BPM.Mvc.Application.Orchard.ELMAEnviromentStarter.RegisterComponents(Object componentManager)
B ELewise. ELMA. BPM. Mvc. Application. Orchard. ELMAEnviromentStarter.ws/M80xaDgDvklKHaE(Object)
B EleWise.ELMA.BPM.Mvc.Application.Orchard.ELMAEnviromentStarter.StartApplicationInThread()*

Fig. 169 ELMA Web Application. Start Error

There may be two causes of this error (Fig. 169).

In the first case, this error is caused by incorrect database connection settings; specifically, the path to the secondary replica is specified, instead of the failover cluster path. To eliminate this error, follow these steps:

- 1. Stop the ELMA pool in IIS Manager.
- 2. Open the configuration file (in this case \\ ELMAConfig\ELMAShared\Config\configuration.config).
- 3. Find the **<connectionStrings>** line and check the database connection string. In this case, the connection must be established to the failover cluster SRV12DBLst, not to its secondary replica DBCLUSTERTEST02.
- 4. Correct the connection string and start the ELMA pool in IIS Manager.

In the second case, the cause is a malfunction in the failover cluster – at least the primary replica failed. You need to start the cluster recovery mechanism in the automatic mode. To eliminate this error, follow these steps:

- 1. Stop ELMA pool in IIS Manager.
- 2. Go to the secondary replica server DBCLUSTERTEST02.
- 3. Restart the operating system on the secondary replica DBCLUSTERTEST02.

This solution may seem strange, but it is the simplest and the most effective way to start the automatic recovery of connection between replicas. There are two more ways to do this:

- 1. Run Manual Failover in MS SQL Management Studio. Unfortunately, if the problem is in the network or the servers, it will not work.
- 2. Restart the failover cluster replica in Failover Cluster Manager. Unfortunately, if the problem is in the MS SQL, it will not work.

Once DBCLUSTERTEST02 is started, you can start the ELMA pool in IIS.

6.9.4. Invalid object name 'ASPState.dbo.ASPStateTempApplications'

This error is caused by the fact that ASPState database was created with incorrect parameters, specifically, with saving the structure in RAM, not as tables.

To eliminate this error, delete the ASPState database and create it again following the instructions in section 3.1.5.

Jul 06 Create Document Register Task Send Message Start Process Create Event Document Thursday Messages Welcome to ELMA! CRM

6.9.5. No styles and images in ELMA Web Application

属 Tasks Tasks

Fig. 170 ELMA Web Application

The underlying reason is usually connected with access to ELMA files. Make sure, that in the settings of the **config** and **Web** folders the Full Access box is checked (Fig. 171) for the account, used for starting the ELMA system.

% (^

Web Properties			2
General Sharing Security Previou	ıs Versions 🗍 (Customize	
Object name: C:\ELMA3-Enterprise	e\Web		
Group or user names:			
& Administrators (SRV12-1\Adr	ministrators)		
& System			
To change permissions, click Edit.		📀 <u>E</u> dit	Т
Permissions for			_
Администраторы	Allow	Deny	-
Full control	\checkmark	-	1
Modify	\sim		н
Read & execute	~		Т
List folder contents	~		Т
Read	~	_	
Write	1		-
For special permissions or advanced click Advanced.	settings,	Ad <u>v</u> anced	
Learn about access control and perm	<u>iissions</u>		
OK	Cancel	Apply	

Fig. 171 Folder properties. Security tab

If permissions are configured correctly, configure IIS as described in steps 1 and 2 of section 4.2.2.

6.9.6. Error HTTP 500.21 – Internal Server Error

HTTP Error 500.21 - Internal Server Error

Handler "NotFound" has a bad module "ManagedPipelineHandler" in its module list

Most likely causes:

- Managed handler is used; however, ASP.NET is not installed or is not installed completely.
 There is a typographical error in the configuration for the handler module list.
 During application initialization, either the application initialization feature has set skipManagedModules to true, or a rewrite rule is setting a URL that maps to a managed handler and is also setting SKIP_MANAGED_MODULES=1.

Things you can try:

- Install ASP.NET if you are using managed handler.
 Ensure that the handler module's name is specified correctly. Module names are case-sensitive and use the format modules="StaticFileModule,DefaultDocumentModule,DirectoryLi
 stingModule".
 Ensure that any application initialization rewrite rules set SKIP_MANAGED_MODULE=0 when setting a URL that maps to a managed handler (such as .aspx, for example.)
 As an alternative, ensure that application initialization rewrite rules map the request to an unmanaged handler (for example, to an .htm file, which is mapped to the StaticFileModule,Ier.)

Detailed Error	Information:			
Module	IIS Web Core	Requested URL	http://localhost:80/	
Notification	ExecuteRequestHandler	Physical Path	C:\ELMA3-Enterprise\Web	
Handler	NotFound	Logon Method	Anonymous	
Error Code	0x8007000d	Logon User	Anonymous	

Fig. 172 Error HTTP 500.21

This error (Fig. 172) indicates incorrect configuration of the manageable code in the IIS pool.

- 1. Open IIS Manager, **Application Pools**.
- 2. Select the ELMA pool and click **Basic settings**... in the right menu
- 3. In the opened dialog box (Fig. 173), specify the correct settings.

Edit Application Pool	? ×
Name: ELMA3-Enterprise	
.NET Eramework version:	
.NET Framework v4.0.30319	•
Managed pipeline mode:	
Integrated	
☑ Start application pool immediately	
OK Canc	el

Fig. 173 Edit Application Pool dialog box

The .Net environment version must be 4.0 or higher, Managed pipeline mode - Integrated.

6.10. Solving Issues with Working in ELMA

6.10.1. Warm up

There are several widely spread reasons of ELMA working slowly.

First, you should keep in mind, that as soon as the system is started/restarted, pages are opened after compilation, which takes more time. When you open a task page right after restarting, the page is first compiled on the server. When you open the task for the second time or refresh the page, it will be passed instantly and it will take less time.

In case of a farm, pages are opened "for the first time" on each server independently.

It means that when you open a task page on a farm, the request is sent, for example, to the first server. The task page is then compiled on the first server and you will see the page in about 5-45 seconds.

When you try to refresh the page, the request may be sent to the second server, where the operation will be executed in the same way for the first time.

To avoid this process taking time of the users, you can manually warm the system up after the start. On each server, open the most popular pages, such as:

- Main page;
- A task page;
- Task list;
- Process instance;
- Messages;
- Process monitor.

6.10.2. The system or its components work slowly after warm up

There may be many reasons for that. First, you need to configure automatic diagnostics, collect results for a period of user work (1-2 hours of active usage) and ask a question on the <u>technical support website</u>.

In most cases, the cause is not in the software components (MS SQL Server, .NET, AppFabric), but in servers and their configurations.

6.10.3. The system works slowly on virtual machines without apparent issues

It is important to check the real load on the host server and the resource reservation. In the simplest case, it is enough to follow recommendations on reserving resources for virtual machines. Contact the system administrator for performance diagnostics.

Unfortunately, the specificity of virtual machines is so, that you can create a "fast" machine on a problematic disk space and end up with unexpected restarts and freezes, you can reserve resources and at the peak the performance will drop, you can create a VM on a slow host-server and no settings will make it work well.

6.10.4. MS SQL Server response time is 500-501 ms.

This issue occurs on virtual machines under VMWare with certain virtual network interfaces. You can be sure that the reason is this, if the MS SQL Server diagnostics results (Fig. 174) show, that request execution waits for the network (ASYNC_NETWORK_IO – item 3 on Fig. 174).

The MS SQL profiler analysis results show that the time to execute SQL queries is insignificant in comparison to the statistics that include the passing of data to the client. Database processes most queries in 0-1 ms.

SQLC	luery4.sql - HO\elmaadmin ((130)) <mark>S</mark> o	QLQuery10.sql	l0\elmaa	dmin (171))*	🗙 SQLQu	ery9.sql - H(0\elmaadmi	n (366))*	Ę	7
<pre>FROM [Waits] AS [W1] INNER JOIN [Waits] AS [W2] ON [W2].[RowNum] <= [W1].[RowNum] GROUP BY [W1].[RowNum], [W1].[wait_type], [W1].[WaitS], [W1].[ResourceS], [W1].[SignalS], [W1].[WaitCount], [W1].[Percentage] HAVING SUM ([W2].[Percentage]) - [W1].[Percentage] < 95; percentage threshold GO</pre>									-	4 +	
											~
100 %	, - (ш					>	
	Results 🛅 Messages										
	WaitType	Wait_S	Resource_S	Signal_S	WaitCount	Percentage	AvgWait_S	AvgRes_S	AvgSig_S		7
1	LATCH_EX	377636.71	353394.87	24241.84	98469350	25.31	0.0038	0.0036	0.0002		
2	QDS_SHUTDOWN_QUEUE	322958.17	322957.56	0.62	5383	21.64	59.9959	59.9958	0.0001		
3	ASYNC_NETWORK_I0	301312.47	295804.56	5507.92	55993383	20.19	0.0054	0.0053	0.0001		
4	CXPACKET	129084.56	123385.82	5698.75	24120933	8.65	0.0054	0.0051	0.0002		
5	HADR_SYNC_COMMIT	124491.60	122871.16	1620.44	8139974	8.34	0.0153	0.0151	0.0002		
6	тск м п	97084.22	97063.68	20.54	101420	6.51	0.9572	0.9570	0.0002		- 1
0	Lou7uTo				101420				0.0002		
7	PAGELATCH_UP	70597.05	67568.29	3028.76	23534982	4.73	0.0030	0.0029	0.0001		

Fig. 174 MS SQL Server diagnostics results

The issue occurs under the following conditions:

- VMWare 6.0 or higher;
- vmxnet3 Ethernet adapter network interfaces;
- slowdown is in MS SQL and it does not affect large file transfer speed;
- slowdown of 500 ms for each request.

This issue is described on the <u>vmware website</u>. There is also a <u>discussion</u> and solution for it.

To bypass this issue, follow the recommendations on all the virtual machines that interact with the MS SQL database.

Application servers:

- 93.158.134.3 SRV12-1
- 213.180.204.3 SRV12-2

Database servers:

- 192.168.18.230 main replica
- 192.168.18.23 secondary replica

Here are some specific recommendations:

1. In the network settings on the servers, open the **Network** tab (Fig. 175), click **Configure**... and go to the **vmxnet3 Ethernet Adapter** parameters (Fig. 176).

🖣 Ethernet Properties	×						
Networking							
Connect using:							
🔮 Intel(R) PR0/1000 MT							
, Configure							
This connection uses the following items:							
 File and Printer Sharing for Microsoft Networks Internet Protocol Version 6 (TCP/IPv6) Internet Protocol Version 4 (TCP/IPv4) Ink-Layer Topology Discovery Mapper I/O Driver Link-Layer Topology Discovery Responder 							
Install Uninstall Properties							
Description Allows your computer to access resources on a Microsoft network.							
OK Cancel							

Fig. 175 Network connection settings

In the opened dialog box, on the **Advanced** tab (Fig. 176), set the Disabled value for the following properties:

- IPv4: Checksum Offload
- IPv4: TSO offload
- Large Send Offload
- Offload TCP Options
- Offload tagged traffic
- TCP Checksum offload

Intel(R) 82574L Gigabit Netw	vork Con	nection Properties	x
General Advanced Driver Detai	ls Events	Power Management	
The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.			
Property:	Va	alue:	
Maximum RSS Processor Number Packet Priority & VLAN Preferred NUMA node Receive Buffers Receive Side Scaling RSS Base Processor Number RSS load balancing profile Speed & Duplex TCP Checksum Offload (IPv4) TCP Checksum Offload (IPv6) Transmit Buffers UDP Checksum Offload (IPv6) Wait for Link		Disabled ¥]
L		OK Cancel	

Fig. 176 Network connection settings

It is also recommended that you disable the IPv6 protocol for these servers.

6.10.5. FastReport reports do not work

If the FastReport reports do not work, read this <u>knowledge base article</u> and follow the instructions. Do not forget to stop the ELMA farm and make changes to the configuration file in the shared folder (see section 4.5).

6.10.6. Everything is OK, but requests are executed slowly

Make sure that there is free disk space on the controller server.

In this case, you will not see any obvious reasons for performance drop, since ELMA servers will work at normal speed, but the users will be receiving responses with a long delay.

You may have run out of disk space because of the enabled IIS logging. Clear the disk of unnecessary files and disable IIS logging as described in section 4.6.

Chapter 7. Additional information

7.1. Migrating user session storage to Redis

If there is a significant number of users working simultaneously and intensively in the system (more than 1000) and if the database report shows that there is an excessive load on the ActiveUserSessions table, it becomes necessary to use the network data storage with user sessions in order to make ELMA work properly.

This Chapter deals with the configuration of the Redis network data storage.

Step 1. It is necessary to start three more new Redis and Sentinel servers that are not connected to the Redis cache. Installing Redis is described above.

Attention! If Redis has already been installed, start the installation with the sudo ./install_server.sh command. Please note that during installation you need to change the default values to new ones (e.g. port 6381, configuration file 6381.config, service redis_6381).

Step 2. Copy the <u>Redis libraries</u> to the **C:\ELMA3-Enterprise\Web\bin\folder**.

Step 3. In the configuration file **C:\ELMA3-Enterprise\Web\Web.config**, the following actions should be performed:

</sessionState>

machine1:6379 is the server address and port, **MyPassword** is the server password.

2. Comment out the blocks of the lines, as follows:

```
<!--<remove name="Session" />-->
```

```
<!--<add
                                                            name="Session"
type="EleWise.ELMA.Web.Mvc.Modules.ELMASessionStateModule,
EleWise.ELMA.SDK.Web" />-->
```

Note that there are several such blocks in the configuration file.

To learn more about migrating user session storage to Redis, see the respective Knowledge Base article. Redis lock settings

You can use Redis networked data storage to store locks.

Step 1. It is necessary to start three more non-synchronized Redis servers without Sentinel that are not connected with those that were previously configured. Redis installation is described above.

Step 2. Make the following changes to the configuration file C:\ELMA3-Enterprise\UserConfig\configuration.config:

1. Add the lines to the **<configSections>** section:

```
<section
                                                               name="lock"
type="EleWise.ELMA.Configuration.GenericProviderFeatureSection`1[[EleWis
e.ELMA.Locking.LockServiceManager,
                                                      EleWise.ELMA.SDK]],
EleWise.ELMA.SDK"/>
   <section
                               name="RedisDistributedLockServiceSettings"
type="EleWise.ELMA.DistributedLock.Redis.RedisDistributedLockServiceSett
```

ings, EleWise.ELMA.DistributedLock.Redis"/>

2. Add the lines at the end of the configuration file:

```
<lock defaultProvider="redis">
```

<providers>

<clear/>

<add

name="redis" type="EleWise.ELMA.DistributedLock.Redis.RedisDistributedLockService, EleWise.ELMA.DistributedLock.Redis"/>

```
</providers>
```

</lock>

<RedisDistributedLockServiceSettings>

<connections>

<add connection="machine1:6379,password=your redis password"/>

<add

connection="machine2:6379,password=your redis password"/>

<add

connection="machine3:6379,password=your redis password"/>

```
</connections> </RedisDistributedLockServiceSettings>
```

machine1:6379, machine2:6379 and machine3:6379 are the addresses and ports of the servers, **your_redis_password** are the passwords of the respective servers.

To learn more about migrating user session storage to Redis, see the <u>respective Knowledge Base article</u>.

Chapter 8. Useful References

Along with this user manual, the following sources describe the functions of **ELMA** applications:

- ELMA BPM Platform user manual
- ELMA Web Portal user manual
- ELMA ECM+ user manual
- ELMA Projects+ user manual
- ELMA KPI user manual
- ELMA Administrator user manual

These manuals walk you through the key features of the system. You can find a more detailed description of ELMA functions in the system Help, available via the following link: <u>https://kb.elma-bpm.com/help</u>.

General description and purchase conditions of the applications are available on ELMA website: <u>http://www.elma-bpm.com</u>. You can also **Ask a question** on this website, using a respective link.

An **Online Demo** <u>http://demo.elma-bpm.com</u> demonstrates the main functions and utilization of the applications.

We continuously develop **ELMA** and Platform-based components for coping with more specific tasks. You can find the list of these components and their purchase conditions at **ELMA Store**: <u>http://store.elma-bpm.com/</u>.

If you are experiencing technical difficulties, please visit ELMA technical support website: <u>http://support.elma-bpm.com</u>.

If you need assistance with the system or have questions about partnership with **ELMA** Company, contact us:

- Luxemburg: + (352) 20-30-11-40
- <u>http://www.elma-bpm.com/contacts/</u>