

**МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РФ**  
**Федеральное государственное автономное**  
**образовательное учреждение высшего образования**  
**«МОСКОВСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»**

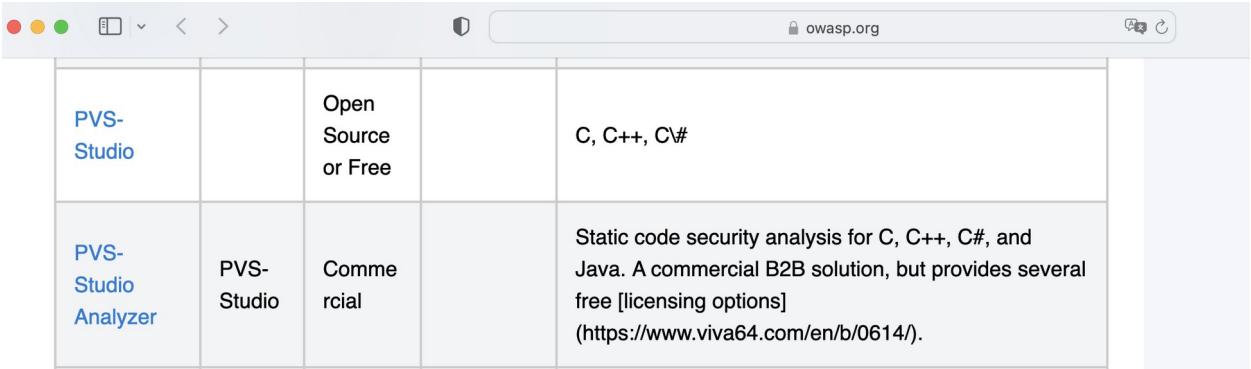
**Лабораторная работа 6**  
**по дисциплине**  
**«Автоматизация процессов жизненного цикла программных средств»**

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## План выполнения лабораторной работы

**1. Провести исследования доступных статических анализаторов для выбранного командой стека разработки (большой, но не всеобъемлющий [список]**

([https://owasp.org/www-community/Source\\_Code\\_Analysis\\_Tools](https://owasp.org/www-community/Source_Code_Analysis_Tools)))



PVS-Studio		Open Source or Free		C, C++, C#
PVS-Studio Analyzer	PVS-Studio	Commercial		Static code security analysis for C, C++, C#, and Java. A commercial B2B solution, but provides several free [licensing options] ( <a href="https://www.viva64.com/en/b/0614/">https://www.viva64.com/en/b/0614/</a> ).

**2. Выбрать минимум два из следующих видов статических анализаторов:**

- a. **анализатор качества кода (пример - Checkstyle)**
- b. **анализатор безопасности кода (Пример - Gosec)**
- c. **средство поиска учетных данных/секретов (Пример - Trufflehog).**

Анализатор PVS-Studio выявляет не только опечатки, мёртвый код и другие ошибки, но и потенциальные уязвимости (Static Application Security Testing, SAST). Анализатор отображает предупреждения на Common Weakness Enumeration, SEI CERT Coding Standards, а также поддерживает стандарт MISRA.

3. Добавить в построенным пайплайне TeamCity шаги, на которых код проверяется статическими анализаторами и, в случае обнаружения проблем максимальной критичности для выбранного анализатора (для анализатора безопасности - CRITICAL, для анализатора качества кода - BLOCKER, для средства поиска секретов - любой обнаруженный пароль), билд завершается с ошибкой.

Добавим шаг, в котором будет происходить процесс анализа серверного кода:

The screenshot shows the 'Build' configuration page in TeamCity. The left sidebar lists various settings: General Settings, Version Control Settings (with 1 warning), Build Steps (4), Triggers (1), Failure Conditions, Build Features (1), Dependencies, Parameters, Agent Requirements, and Suggestions. Below these is a note: 'Last edited moments ago by admin (view history)'. At the bottom of the sidebar are 'View as code' and a help icon. The main content area has a yellow header bar stating 'Build step enabled.' It contains a 'Build Steps' section with a table listing four steps:

Build Step	Parameters Description	Edit
1. Analize and ConvertAnalysisResults	Command Line Custom script: apt install apt-utils -y (and 28 more lines) Execute: If all previous steps finished successfully	Edit
2. Docker build	Docker Docker build; Dockerfile location: Dockerfile ; context directory: . Execute: If all previous steps finished successfully	Edit
3. Docker push	Docker docker push photolife/medhelper:latest; remove image(s) after push Execute: If all previous steps finished successfully	Edit
4. Connect SSH	SSH Exec Target: 192.168.31.4 Port: 22 Commands: cd /home/auto-server docker pull photolife/medhelper docker compose up -d Execute: If all previous steps finished successfully	Edit

## Рассмотрим шаг «Analyze and ConvertAnalysisResults»:

The screenshot shows the 'Build Step (1 of 4): Analyze and ConvertAnalysisResults' configuration in TeamCity. The 'Custom script' field contains the following shell script:

```
1 apt install apt-utils -y
2 apt-get update -y
3 apt-get install qt5-qmake -y
4 apt-get install cmake -y
5 apt-get install qt5-default -y
6 apt-get install qtbase5-dev -y
7 apt-get install build-essential -y
8 apt-get install wget -y
9 wget -q -O - https://cdn.pvs-studio.com/etc/pubkey.txt | apt-key add - -y
10 wget -O /etc/apt/sources.list.d/viva64.list https://cdn.pvs-studio.com/etc/viva64.list
11 apt-get update -y
12 apt-get install pvs-studio -y
13 pvs-studio-analyzer credentials 817601@mail.ru 5DMG-77B4-25N1-2WGF
14 cd ./untitled9
15 rm -f compile_commands.json
16 rm -f moc*
17 rm -f Makefile
18 rm -f *
```

The 'Format stderr output as:' dropdown is set to 'error'. The 'Run step within Docker container:' section is empty.

Разберем подробнее custom script:

#Установим apt-utils и обновим индекс пакетов:

```
apt install apt-utils -y
```

```
apt-get update -y
```

#Установим Qt и компиляторы

```
apt-get install qt5-qmake -y
```

```
apt-get install cmake -y
```

```
apt-get install qt5-default -y
```

```
apt-get install qtbase5-dev -y
```

```
apt-get install build-essential -y
```

```
apt-get install wget -y
```

#Установим непосредственно pvs-studio

```
wget -q -O - https://cdn.pvs-studio.com/etc/pubkey.txt | apt-key add - -y
```

```
wget -O /etc/apt/sources.list.d/viva64.list https://cdn.pvs-studio.com/etc/viva64.list
```

```
apt-get update -y
```

```
apt-get install pvs-studio -y
```

#Добавим лицензию pvs-studio

pvs-studio-analyzer credentials 817601@mail.ru 5DMG-77B4-25N1-2WGF

#Перейдем в папку сервера:

cd ./untitled9

#Удалим старые сборки и старые версии файлов:

rm -f compile\_commands.json

rm -f moc\*

rm -f Makefile

rm -f \*.o

rm -f untitled9.pro

rm -f strace\_out

rm -f pvs.log

rm -f pvs\*.tasks

#Проведем трассировку компиляции (соберем проект):

qmake -o Makefile untitled.pro

make clean

pvs-studio-analyzer trace -- make

rm -f moc\*

#Удалим старую директорию для сохранения отчета и создадим новую:

rm -R ./report

mkdir ./report

#Запустим анализ нашего сервера:

pvs-studio-analyzer analyze -l /root/.config/PVS-Studio/PVS-Studio.lic -o pvs.log  
--disableLicenseExpirationCheck

#Сохраним отчет в формате .html в созданной папке:

plog-converter -a GA:1,2 --renderTypes fullhtml -t tasklist -o ./report/ pvs.log

#Заменим «фальшивые» err просто на 1, чтобы корректно найти критические ошибки:

sed "s|pvs-studio.com/en/docs/warnings/|1|err| Help: The documentation for all analyzer warnings is available here:

<https://pvs-studio.com/en/docs/warnings/.|1|> ./report/pvs.tasks > ./report/pvs1.tasks

sed "s|err|Renew|1|" ./report/pvs1.tasks > ./report/pvs2.tasks

#Найдем err в отчете (если err будет найден, то код – 0, иначе – 1):

```
grep -r 'err' ./report/pvs2.tasks
```

#Выведем в случае обнаружения err в отчете код 1 (если ошибок нет, то 0):

```
if [ $? -eq 0 ]
```

```
then
```

```
    exit 1
```

```
else
```

```
    exit 0
```

```
fi
```

После создания шага настроим пути Arthifast, то есть пропишем в них путь созданной папки report, чтобы после успешного выполнения сборки отчёт анализатора будет доступен в артефактах:

The screenshot shows the 'General Settings' page for a build configuration named 'Build'. The 'Build configuration' dropdown is set to 'ElyalgorAlex\_Build'. The 'Artifact paths' field contains the path './untitled9/report/'. The page includes navigation links like 'Administration', 'Changes', 'Agents 1', 'Queue 0', and 'Help'.

Также можно сделать так, чтобы отчёт анализатора отображался на специальной вкладке отчёта о сеансе сборки. Для этого необходимо перейти в настройки проекта, открыть 'Report Tabs' и добавить новую вкладку отчёта сборки ('Create new build report tab').

The screenshot shows the TeamCity Administration interface. In the top navigation bar, there are links for 'Projects | v', 'Changes', 'Agents 1', 'Queue 0', 'Administration', a help icon, a search icon, and an 'AD' button. A banner at the top indicates a release: 'TeamCity 2022.10 (build 116751) has been released. View details on the Updates page.' Below the banner, the current project is listed as 'Elya Igor Alex' with '1 warning 2 info items'. On the left, a sidebar menu includes 'General Settings', 'VCS Roots 3', 'Report Tabs' (which is currently selected), 'Parameters', 'Connections 1', 'SSH Keys', 'Shared Resources', 'Meta-Runners', 'Maven Settings', 'Issue Trackers', 'Cloud Profiles', 'Clean-up Rules', 'Versioned Settings', 'Artifacts Storage', 'NuGet Feed', 'Suggestions 1', and a link to '« Hide unconfigured'.

In the main content area, there are two buttons: '+ Create new project report tab' and '+ Create new build report tab'. The 'Build Report Tabs' section is active, showing a table with one row:

Tab Title	Start Page
Code Coverage (inherited from project "<Root project>")	coverage.zip!index.html

The 'Project Report Tabs' section is also present but empty.

В окне добавления вкладки в поле 'Start page' необходимо указать путь к файлу 'index.html' относительно корневой папки артефактов:

The dialog box is titled 'Edit Report Tab Settings'. It contains the following fields:

- Tab Title:** \* Pvs-Studio-REPORT
- Get artifacts from:** \* Elya Igor Alex / Build  
Build configuration that produces artifact with the report
- Latest finished build** (dropdown menu)
- Build branch filter:** +:\*
- Start page:** pvs.fullhtml/index.html  
Relative path from the root of build's artifacts to a start page of the generated report.  
To reference a file from an archive, use the [path-to-archive]![relative-path] syntax.

At the bottom, there are 'Save' and 'Cancel' buttons.

The screenshot shows the TeamCity Administration interface for the project "Elya Igor Alex". The left sidebar lists various settings like General Settings, VCS Roots, Report Tabs (which is selected), Parameters, Connections, SSH Keys, Shared Resources, Meta-Runners, Maven Settings, Issue Trackers, Cloud Profiles, Clean-up Rules, Versioned Settings, Artifacts Storage, NuGet Feed, and Suggestions. A message at the top indicates a new release is available. The main content area is titled "Report tab updated" and contains sections for "Build Report Tabs" and "Project Report Tabs". In "Build Report Tabs", there is a table with one row: Tab Title "Code Coverage (inherited from project: <Root project>)" and Start Page "coverage.zip/index.html". In "Project Report Tabs", there is a table with one row: Tab Title "Pvs-Studio-REPORT" and Get Artifacts From "... Build (Latest finished build, branch filter: +:\*)". Buttons for "Create new project report tab" and "Create new build report tab" are also present.

Зафиксируем успешную сборку из feature1:

The screenshot shows the TeamCity Build Log for build #101, triggered on 13 Nov 22 21:57. The build status is Success. The log details show the result was successful, it took 58 seconds, and it was triggered by a user on the same date and time. A note at the bottom indicates this build is in the user's favorites.

Result:	Success	Agent:	ip_172.17.0.1
Time:	13 Nov 22 21:57:34 - 21:58:32 (58s)	Triggered by:	you on 13 Nov 22 21:57
Branch:	feature1		

Посмотрим созданные отчеты с анализом кода сервера:

Elya Igor Alex / Build

✓ #101 (13 Nov 22 21:57) | ▾

Overview Changes Build Log Parameters Artifacts PerfMon

★ This build is in your favorites

▼ pvs.fullhtml

- > images
- > sources
  - index.html 1.98 KB
  - jquery-3.5.1.min.js 87.37 KB
  - script.js 4.58 KB
  - style.css 1.51 KB
- pvs.tasks 265 B

Show hidden artifacts

Total size: 131.76 KB

Projects | Changes Agents 1 Queue 0 Administration ? AD

⚠ TeamCity 2022.10 (build 116751) has been released. View details on the [Updates page](#).

⚠ Domain isolation protection for artifacts is disabled. ⓘ ... Show more

Elya Igor Alex

Overview Change Log Statistics Current Problems Investigations Muted Problems Flaky Tests 0 Pvs-Studio-REPORT

Data was taken from Elya Igor Alex / Build, build 101 | ▾ started at 13 Nov 22 21:57

 **PVS-Studio Analysis Results**

Date:	Sun Nov 13 21:58:31 2022
PVS-Studio Version:	7.21.64848.262
Command Line:	plog-converter -a GA\1,2 --renderTypes fullhtml -t tasklist -o ./untitled9/report/ pvs.log
Fails/Info:	1

Group Location Level Code Message

[Renew](#) Your license will expire in 5 days. Click 'Renew' to learn more or contact us at support@viva64.com.

Теперь зафиксируем сборку с ошибками из ветки feature4:

The screenshot shows the TeamCity interface for build #164. At the top, there are two warning messages: "TeamCity 2022.10 (build 116751) has been released. View details on the [Updates page](#)." and "Domain isolation protection for artifacts is disabled. ⓘ...". Below this, the build status is shown as failed (#164, 17 Nov 22 17:47). The "Changes" tab is selected. The build log indicates a process exited with code 1 (Step: Analyze and ConvertAnalysisResults (Command Line)) (new). The build was triggered by "you" on 17 Nov 22 17:47 from branch "feature4". A note says "★ This build is in your favorites". Under "Build problems", it shows 1 new problem: "Process exited with code 1 (Step: Analyze and ConvertAnalysisResults (Command Line))". The "Artifacts" tab is selected, displaying the contents of the build artifacts folder. The folder structure includes "pvs.fullhtml", "images", "sources", "index.html", "jquery-3.5.1.min.js", "script.js", "style.css", "pvs.tasks", "pvs1.tasks", and "pvs2.tasks". A link to "Download all (.zip)" is available. The total size of the artifacts is 146.89 KB.

TC Projects | Changes Agents 1 Queue 0 Administration ?  Hide ▾

⚠ TeamCity 2022.10 (build 116751) has been released. View details on the [Updates page](#).

⚠ Domain isolation protection for artifacts is disabled. ⓘ ... Show more

🕒 Elya Igor Alex

Overview Change Log Statistics Current Problems Investigations Muted Problems Flaky Tests 0 Pvs-Studio-REPORT

Data was taken from Elya Igor Alex / Build, build 164 | ⏺ started at 17 Nov 22 17:47

 **PVS-Studio Analysis Results**

Date:	Thu Nov 17 17:48:37 2022		
PVS-Studio Version:	7.21.64848.262		
Command Line:	plog-converter -a GA\1.2 --renderTypes fullhtml -t tasklist -o ./report/ pvs.log		
Total Warnings (GA):	3		
Fails/Info:	1		

Group	Location	Level	Code	Message
General Analysis	<a href="#">functions.cpp:21</a>	Medium	V640	<a href="#">Renew</a> Your license will expire in 6 days. Click 'Renew' to learn more or contact us at support@viva64.com.
General Analysis	<a href="#">mytcpserver.cpp:25</a>	High	V611	The code's operational logic does not correspond with its formatting. The statement is indented to the right, but it is always executed. It is possible that curly brackets are missing.
General Analysis	<a href="#">mytcpserver.cpp:24</a>	Medium	V799	The memory was allocated using 'new T' operator but was released using the 'delete []' operator. Consider inspecting this code. It's probably better to use 'delete server';.