

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РФ
Федеральное государственное автономное
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«МОСКОВСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ»

Лабораторная работа 7
по дисциплине
«Автоматизация процессов жизненного цикла программных средств»

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План выполнения лабораторной работы

1. Выбрать библиотеку, либо фреймворк для тестирования ПО на выбранном для разработки стеке

Инструментарий **QTestLib**, предоставленный компанией Nokia, является средством для тестирования приложений и библиотек Qt. QTestLib предоставляет полный базовый функционал для тестирования графического пользовательского интерфейса.

2. Разработать набор юнит- и интеграционных тестов для разработанной части ПО, таким образом, чтобы тестирование покрывало от 40% функционала, описанного в техническом задании. В отчете описать каждый отдельный тест (опционально - с примером кода), в частности, описать, какой модуль (модули) тестируется, какой ожидаемый результат, какие данные используются для получения искомого результата.

В наборе unit тестов будут протестированы следующие аспекты:

- открытие базы данных;
- запросы к базе данных;
- авторизация на сервере;
- связь сервера с базой данных.

testmed.pro

```
QT += testlib #подключаем библиотеку тестирования
```

```
QT -= gui
```

```
QT += network #для работы с сетью
```

```
QT += sql #для базы данных
```

```
CONFIG += qt console warn_on depend_includepath testcase
```

```
CONFIG -= app_bundle
```

```
TEMPLATE = app
```

```
SOURCES += \
```

```
tst_testmed.cpp \
database.cpp \
functions.cpp

# Default rules for deployment.
qnx: target.path = /tmp/$${TARGET}/bin
else: unix:!android: target.path = /opt/$${TARGET}/bin
!isEmpty(target.path): INSTALLS += target

HEADERS += \
    database.h \
    functions.h
```

tst med testmed.cpp

```
#include <QtTest> //библиотека тестирования
#include "functions.h" //подключение заголовочного файла с тестируемой функцией
//авторизации на сервере
#include "database.h" //подключение заголовочного файла с базой данных

class testmed : public QObject
{
    Q_OBJECT

public:
    testmed();
    ~testmed();

private slots:
    void initTestCase();
    void cleanupTestCase();
    void message_to_server_yes1();
    void message_to_server_yes2();
    void message_to_server_no();
};

testmed::testmed()
{
}

testmed::~testmed()
{
}

void testmed::initTestCase()
{
}
```

```

}

void testmed::cleanupTestCase()
{
}

//1-ая проверка прохождения авторизации с корректной учетной записью
void testmed::message_to_server_yes1()
{
    std::string log = "ivan";
    std::string pass = "Qwerty123!";
    QString result = authorize(log,pass);
    QVERIFY("authorization yes " == result);
}

//2-ая проверка прохождения авторизации с корректной учетной записью
void testmed::message_to_server_yes2()
{
    std::string log = "fedor";
    std::string pass = "Asdfg123!";
    QString result = authorize(log,pass);
    QVERIFY("authorization yes " == result);
}

//проверка прохождения авторизации с ошибочной учетной записью
void testmed::message_to_server_no()
{
    std::string log = "user";
    std::string pass = "12343424346";
    QString result = authorize(log,pass);
    QVERIFY("authorization error " == result);
}

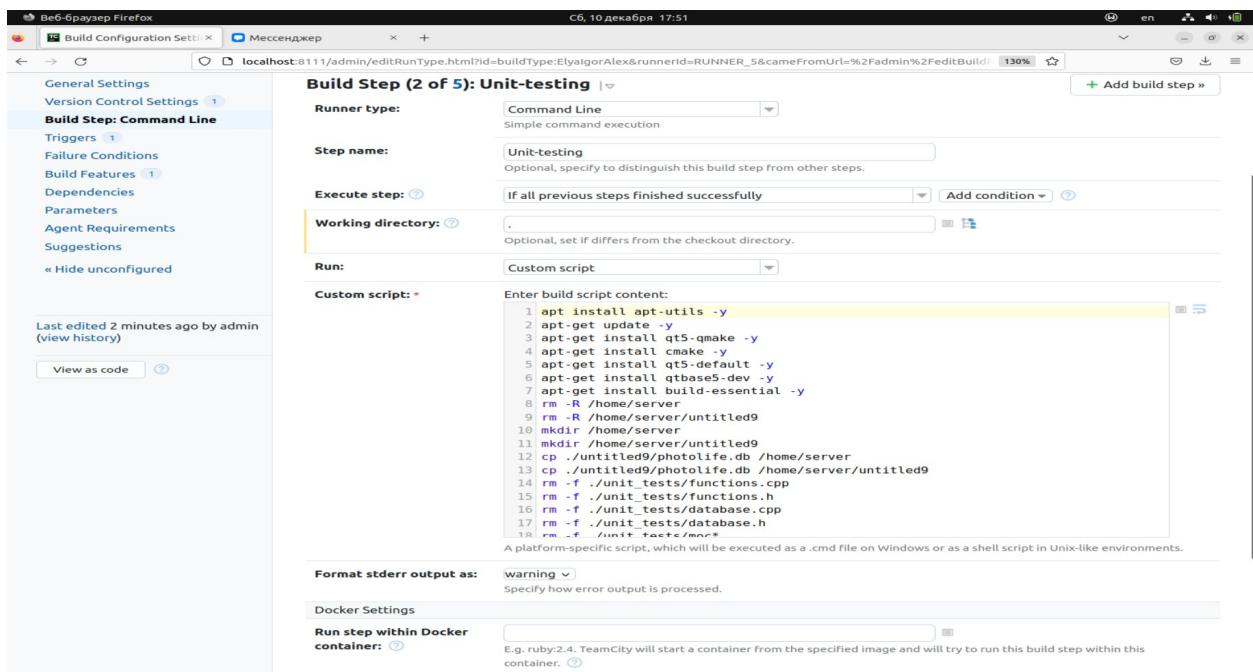
 QTest_APPLESS_MAIN(testmed)

#include "tst_testmed.moc"

```

3. Добавить к разработанным конфигурациям сборки в TeamCity шаги, осуществляющие автоматическое тестирование разработанного кода (независимо от ветки, в которой код находится)

Добавим новый шаг для unit тестов (сделаем его 2-ым по очереди):



Рассмотрим скрипт в новом шаге:

#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
```

#Удалим «старые» директории вместе с БД

```
rm -R /home/server
```

```
rm -R /home/server/untitled9
```

#Создадим директории для БД

```
mkdir /home/server
```

```
mkdir /home/server/untitled9
```

#Вставим БД в созданные директории

```
cp ./untitled9/photolife.db /home/server
```

```
cp ./untitled9/photolife.db /home/server/untitled9
```

#Удалили «старые» сборки и версии тестируемых файлов

```
rm -f ./unit_tests/functions.cpp
```

```
rm -f ./unit_tests/functions.h
```

```
rm -f ./unit_tests/database.cpp
```

```
rm -f ./unit_tests/database.h
```

```
rm -f ./unit_tests/moc*
```

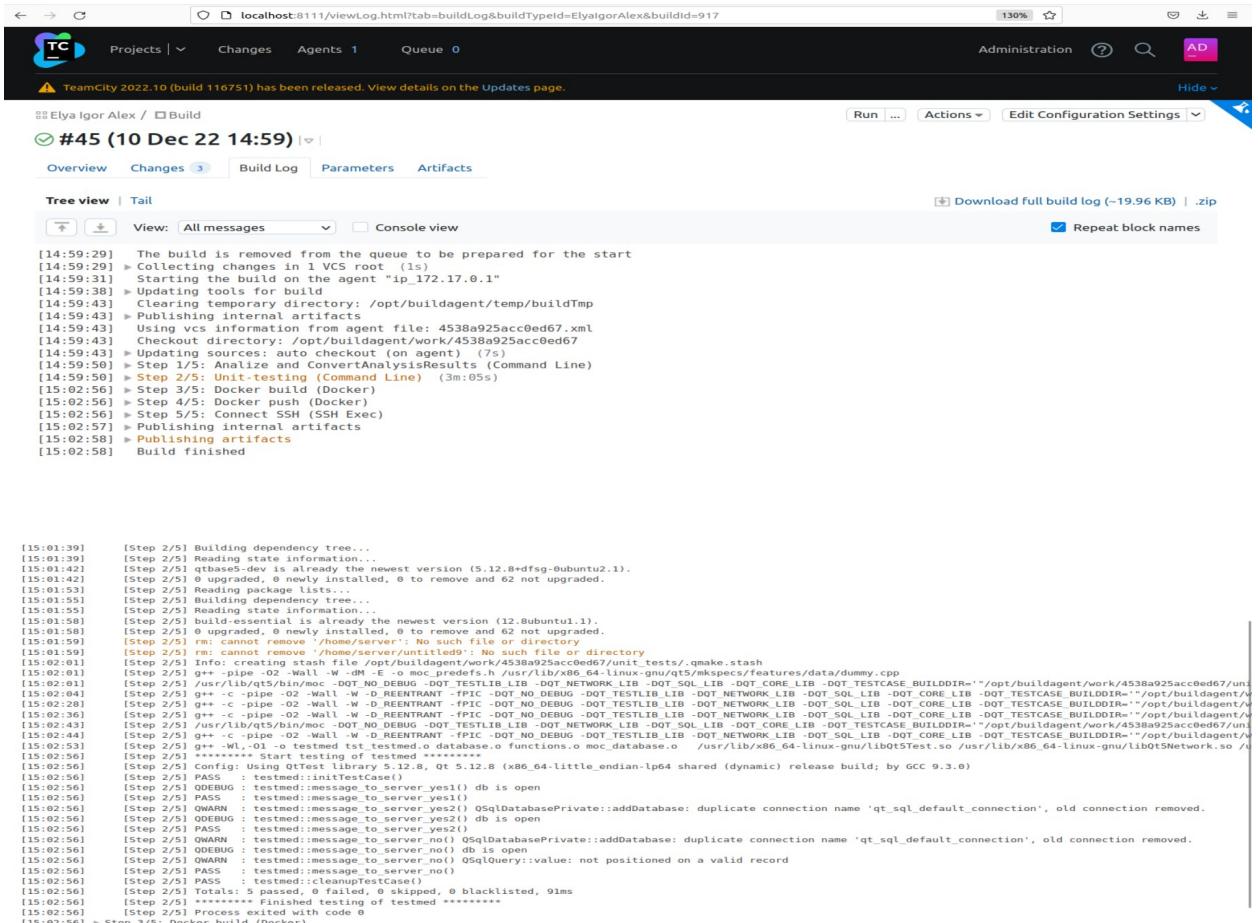
```

rm -f ./unit_tests/Makefile
rm -f ./unit_tests/*.o
#Скопируем в папку unit тестов тестируемые файлы сервера
cp ./untitled9/functions.cpp ./unit_tests
cp ./untitled9/functions.h ./unit_tests
cp ./untitled9/database.cpp ./unit_tests
cp ./untitled9/database.h ./unit_tests
cd ./unit_tests
#Выполним сборку тестов
qmake testmed.pro
make
#Запустим unit тесты
./testmed

```

4. Продемонстрировать хотя бы одно неуспешное прохождение теста (с заранее плохим кодом, не тестом) и по одному успешному прохождению шагов тестирования для одной FEATURE/FIX ветки, DEV-ветки и PROD-ветки.

Успешное прохождение тестов для ветки **main** (5/5 тестов успешны):



```

localhost:8111/viewLog.html?tab=buildLog&buildTypeId=ElyaigorAlex&buildId=91
Projects | Changes Agents 1 Queue 0 Administration ? Hide ▾
TeamCity 2022.10 (build 116751) has been released. View details on the Updates page.
Elya Igor Alex | Build
#45 (10 Dec 22 14:59) | ▾
Overview Changes 3 Build Log Parameters Artifacts
Tree view | Tail
View: All messages ▾ Console view
Download full build log (~19.96 KB) | .zip
Repeat block names
[14:59:29] The build is removed from the queue to be prepared for the start
[14:59:29] > Collecting changes in 1 VCS root (1s)
[14:59:31] Starting the build on the agent "ip_172.17.0.1"
[14:59:38] > Updating tools for build
[14:59:43] Clearing temporary directory: /opt/buildagent/temp/buildTmp
[14:59:43] > Publishing internal artifacts
[14:59:43] Using vcs information from agent file: 4538a925acc0ed67.xml
[14:59:43] Checkout directory: /opt/buildagent/work/4538a925acc0ed67
[14:59:43] > Updating sources: auto checkout (on agent) (7s)
[14:59:48] > Fetching sources and CommitAnalysisResults (Command Line)
[14:59:50] > Step 2/5: Unit-testing (Command Line) (3m:05s)
[15:02:56] > Step 3/5: Docker build (Docker)
[15:02:56] > Step 4/5: Docker push (Docker)
[15:02:56] > Step 5/5: Connect SSH (SSH Exec)
[15:02:57] > Publishing internal artifacts
[15:02:58] Publishing artifacts
[15:02:58] Build finished

[15:01:39] [Step 2/5] Building dependency tree...
[15:01:39] [Step 2/5] Reading state information...
[15:01:42] [Step 2/5] libbase5-dev is already the newest version (5.12.8+dfsg-0ubuntu2.1).
[15:01:42] [Step 2/5] libcurl4-openssl-dev is newly installed, 0 to remove and 62 not upgraded.
[15:01:43] [Step 2/5] Reading package list...
[15:01:53] [Step 2/5] Building dependency tree...
[15:01:53] [Step 2/5] Reading state information...
[15:01:58] [Step 2/5] libcurl4-openssl-dev is already the newest version (5.12.8+dfsg-0ubuntu2.1).
[15:01:58] [Step 2/5] libcurl4-openssl-dev is newly installed, 0 to remove and 62 not upgraded.
[15:01:59] [Step 2/5] rm: cannot remove '/home/server/untitled9': No such file or directory
[15:01:59] [Step 2/5] Info: creating static file /opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so.5.12.8
[15:01:59] [Step 2/5] Info: creating static file /opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Network.so.5.12.8
[15:02:01] [Step 2/5] /usr/lib/qt5/bin/moc -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:04] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:28] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:30] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:43] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:44] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT_NO_DEBUG -DOT_TESTLIB_LIB -DOT_NETWORK_LIB -DOT_CORE_LIB -DOT_TESTCASE_BUILDDIR=~/opt/buildagent/work/4538a925acc0ed67/unix/lib/libQt5Test.so
[15:02:53] [Step 2/5] g++ -Wl,-O1 -Wl,-Bsymbolic-functions -Wl,--start-group /tmp/testmed.o database.o functions.o moc_database.o /usr/lib/x86_64-linux-gnu/libQt5Network.so /usr/lib/x86_64-linux-gnu/libQt5Test.so /usr/lib/x86_64-linux-gnu/libQt5Core.so
[15:02:54] [Step 2/5] Config: Using QTest library 5.12.8, Qt 5.12.8 (x86_64-little_endian-lp64 shared (dynamic) release build; by GCC 9.3.0)
[15:02:56] [Step 2/5] PASS : testmed::initTestCase()
[15:02:56] [Step 2/5] QDEBUG : testmed::message_to_server_yes1() db is open
[15:02:56] [Step 2/5] QWARN : testmed::message_to_server_yes1() db is open
[15:02:56] [Step 2/5] QDEBUG : testmed::message_to_server_yes2() db is open
[15:02:56] [Step 2/5] QDEBUG : testmed::message_to_server_yes2() db is open
[15:02:56] [Step 2/5] QWARN : testmed::message_to_server_no1() QSqlDatabasePrivate::addDatabase: duplicate connection name 'qt_sql_default_connection', old connection removed.
[15:02:56] [Step 2/5] QDEBUG : testmed::message_to_server_no1() QSqlDatabasePrivate::addDatabase: duplicate connection name 'qt_sql_default_connection', old connection removed.
[15:02:56] [Step 2/5] QWARN : testmed::message_to_server_no1() QSqlQuery::value: not positioned on a valid record
[15:02:56] [Step 2/5] QDEBUG : testmed::message_to_server_no1() QSqlQuery::value: not positioned on a valid record
[15:02:56] [Step 2/5] PASS : testmed::message_to_server_no1()
[15:02:56] [Step 2/5] QSS : testmed::loadScriptTCCase()
[15:02:56] [Step 2/5] 5 passed, 0 failed, 0 skipped, 0 blacklisted, 91ms
[15:02:56] ***** Finished testing of testmed *****
[15:02:56] [Step 2/5] Process exited with code 0
Elya.igor Alex ~ $team ci R: Docker build [hooker]

```

Успешное прохождение тестов для ветки **dev** (5/5 тестов успешны):

The screenshot shows the TeamCity 2022.10 build overview page. It displays two successful builds: 'main' (Build #45) and 'dev' (Build #46). Both builds show a green success status and were run moments ago (3m:24s and 3m:16s respectively). The page includes navigation links for 'Projects', 'Changes', 'Agents 1', 'Queue 0', 'Administration', and 'Configure Visible Projects'.

The screenshot shows the TeamCity 2022.10 build log page for build #46. It displays logs for both the 'main' and 'dev' branches. The logs show the build process, including collecting changes, starting the build on an agent, updating tools, publishing artifacts, and connecting SSH. The logs are presented in a tree view and can be viewed in 'Console view'. A link to download the full build log (~19.88 KB) is available.

```

[15:04:07] The build is removed from the queue to be prepared for the start
[15:04:08] > Collecting changes in 1 VCS root
[15:04:09] Starting the build on the agent "ip_172.17.8.1"
[15:04:15] > Updating tools for build
[15:04:17] > Clearing temporary directory: /opt/buildagent/temp/buildTmp
[15:04:18] > Publishing internal artifacts
[15:04:19] Using vcs information from agent file: 4538a925acc0ed67.xml
[15:04:19] Checked out directory: /opt/buildagent/work/4538a925acc0ed67
[15:04:19] Upgrading sources auto checkout (on agent) (4s)
[15:04:22] > Step 1/5: Analyze and ConvertAnalysisResults (Command Line)
[15:04:22] > Step 2/5: Unit-testing (Command Line) (3m:05s)
[15:07:27] > Step 3/5: Docker build (Docker)
[15:07:27] > Step 4/5: Docker push (Docker)
[15:07:27] > Step 5/5: Connect SSH (SSH Exec)
[15:07:29] > Publishing internal artifacts
[15:07:29] > Publishing artifacts
[15:07:29] Build finished

[15:05:31] [Step 2/5] cmake is already the newest version (3.16.3-1ubuntu1.20.04.1).
[15:05:31] [Step 2/5] 0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
[15:05:42] [Step 2/5] Reading package lists...
[15:05:45] [Step 2/5] Building dependency tree...
[15:05:45] [Step 2/5] Reading state information...
[15:05:48] [Step 2/5] qt5-default is already the newest version (5.12.8-0dfsg-0ubuntu2.1).
[15:05:48] [Step 2/5] 0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
[15:05:49] [Step 2/5] Reading package lists...
[15:05:49] [Step 2/5] Building dependency tree...
[15:06:01] [Step 2/5] Reading state information...
[15:06:04] [Step 2/5] qtbase5-dev is already the newest version (5.12.8-0dfsg-0ubuntu2.1).
[15:06:04] [Step 2/5] 0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
[15:06:14] [Step 2/5] Reading package lists...
[15:06:17] [Step 2/5] Building dependency tree...
[15:06:17] [Step 2/5] Reading state information...
[15:06:19] [Step 2/5] build-essential is already the newest version (12.ubuntu1.1).
[15:06:19] [Step 2/5] 0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
[15:06:19] [Step 2/5] rm: cannot remove '/home/server/untitled9*: No such file or directory
[15:06:20] [Step 2/5] Info: creating stash file /opt/buildagent/work/4538a925acc0ed67/unit tests/.qmake.stash
[15:06:20] [Step 2/5] Using Qt 5.12.8 -Wl,-O1 -o testmed testmed.o database.o functions.o moc_database.o /usr/lib/x86_64-linux-gnu/libQt5Network.so /usr/lib/x86_64-linux-gnu/libQt5Sql.so /usr/lib/x86_64-linux-gnu/libQt5Core.so /usr/lib/x86_64-linux-gnu/libQt5Test.so
[15:06:21] [Step 2/5] Using /opt/qt5/bin/moc -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:06:23] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:06:48] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:07:09] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:07:13] [Step 2/5] /usr/lib/qt5/bin/moc -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:07:14] [Step 2/5] g++ -c -pipe -O2 -Wall -W -D REENTRANT -fPIC -DOT NO DEBUG -DOT TESTLIB LIB -DOT NETWORK LIB -DOT SOL LIB -DOT CORE LIB -DOT TESTCASE BUILDDIR="/opt/buildagent/work/4538a925acc0ed67/unix"
[15:07:25] [Step 2/5] g++ -WL,-O1 -o testmed testmed.o database.o functions.o moc_database.o /usr/lib/x86_64-linux-gnu/libQt5Network.so /usr/lib/x86_64-linux-gnu/libQt5Sql.so /usr/lib/x86_64-linux-gnu/libQt5Core.so /usr/lib/x86_64-linux-gnu/libQt5Test.so
[15:07:27] [Step 2/5] Config: Using QTest library 5.12.8, at 5.12.8 (x86_64-little_endian-lp64 shared (dynamic) release build; by GCC 9.3.0)
[15:07:27] [Step 2/5] PASS : testmed::initTestCase()
[15:07:27] [Step 2/5] QWARN : testmed::message_to_server_yes1() QSqlDatabasePrivate::addDatabase: duplicate connection name 'qt_sql_default_connection', old connection removed.
[15:07:27] [Step 2/5] QWARN : testmed::message_to_server_yes2() QSqlDatabasePrivate::addDatabase: duplicate connection name 'qt_sql_default_connection', old connection removed.
[15:07:27] [Step 2/5] QWARN : testmed::message_to_server_no1() QSqlDatabasePrivate::addDatabase: duplicate connection name 'qt_sql_default_connection', old connection removed.
[15:07:27] [Step 2/5] QWARN : testmed::message_to_server_no1() QSqlQuery::value: not positioned on a valid record
[15:07:27] [Step 2/5] QWARN : testmed::message_to_server_no1() QSqlQuery::value: not positioned on a valid record
[15:07:27] [Step 2/5] PASS : testmed::cleanupTestCase()
[15:07:27] [Step 2/5] Totals: 5 passed, 0 failed, 0 skipped, 0 blacklisted, 47ms
[15:07:27] [Step 2/5] **** Finished testing of testmed ****
[15:07:27] [Step 2/5] Process exited with code 0
[15:07:27] > Step 3/5: Docker build (Docker)
[15:07:27] > Step 4/5: Docker push (Docker)
[15:07:27] > Step 5/5: Connect SSH (SSH Exec)

```

Успешное прохождение тестов для ветки **feature1** (5/5 тестов успешны):

The screenshot shows the TeamCity 2022.10 build details page for the 'feature1' branch. It displays a single successful build (#47) with a green success status and was run moments ago (1m:37s). The page includes navigation links for 'Projects', 'Changes', 'Agents 1', 'Queue 0', 'Administration', and 'Run ...'.

The screenshot shows a TeamCity build interface. At the top, it says "TeamCity 2022.10 (build 116751) has been released. View details on the Updates page." Below that, it shows a build summary for "#47 (10 Dec 22 15:08)". The build status is green. The build log tab is selected, showing a detailed log of the build process. The log includes steps like collecting changes, updating tools, publishing artifacts, and running unit tests. It ends with a "Build finished" message.

```
[15:08:46] > The build is removed from the queue to be prepared for the start
[15:08:47] > Collecting changes in 1 VCS root (1s)
[15:08:47] Starting the build on the agent "ip_172.17.0.1"
[15:08:50] > Updating tools for build
[15:08:53] > Clearing temporary directory: /opt/buildagent/temp/buildTmp
[15:08:53] > Publishing internal artifacts
[15:08:53] Using vcs information from agent file: 4538a925acc0ed67.xml
[15:08:53] Checkout directory: /opt/buildagent/work/4538a925acc0ed67
[15:08:53] > Updating sources: auto checkout (on agent) (4s)
[15:08:57] > Step 1/5: Analyze and ConvertAnalysisResults (Command Line)
[15:08:57] > Step 2/5: Unit-testing (Command Line) (1m:25s)
[15:10:23] > Step 3/5: Docker build (Docker)
[15:10:23] > Step 4/5: Docker push (Docker)
[15:10:23] > Step 5/5: Connect SSH (SSH Exec)
[15:10:24] Publishing internal artifacts
[15:10:24] > Publishing artifacts
[15:10:25] Build finished
```

Неуспешное прохождение тестов для ветки **feature3** (4/5 тестов успешны, в 3-ем teste ошибка при проверке учетной записи из БД):

The screenshot shows a TeamCity build interface for the "feature3" branch. It indicates an "Exit code 1" error. The build log for "#48 (10 Dec 22 15:11)" shows a series of steps, including collecting changes, updating tools, and running unit tests. The log ends with an error message about apt not having a stable CLI interface, followed by a warning about reading package lists from localhost.

```
[15:11:10] > The build is removed from the queue to be prepared for the start
[15:11:10] > Collecting changes in 1 VCS root
[15:11:11] Starting the build on the agent "ip_172.17.0.1"
[15:11:12] > Updating tools for build
[15:11:13] > Clearing temporary directory: /opt/buildagent/temp/buildTmp
[15:11:13] > Publishing internal artifacts
[15:11:13] Using vcs information from agent file: 4538a925acc0ed67.xml
[15:11:13] Checkout directory: /opt/buildagent/work/4538a925acc0ed67
[15:11:13] > Updating sources: auto checkout (on agent) (1s)
[15:11:15] > Step 2/5: Analyze and ConvertAnalysisResults (Command Line) (55s)
[15:11:15] [Step 2/5] Starting: /opt/buildagent/temp/agentTmp/custom_script15488360096948398717
[15:11:15] [Step 2/5] in directory: /opt/buildagent/work/4538a925acc0ed67
[15:11:15] [Step 2/5]
[15:11:15] [Step 2/5] WARNING: apt does not have a stable CLI interface. Use with caution in scripts.
[15:11:15] [Step 2/5]
[15:11:19] [Step 2/5] Reading package lists...
[15:11:20] [Step 2/5] Building dependency tree...
[15:11:20] [Step 2/5] Reading state information...
[15:11:21] [Step 2/5] apt-utils is already the newest version (2.0.9).
[15:11:21] [Step 2/5] 0 upgraded, 0 newly installed, 0 to remove and 62 not upgraded.
[15:11:22] [Step 2/5] Hit:1 http://ppa.launchpad.net/gi-t-core/ppa/ubuntu focal InRelease
[15:11:22] [Step 2/5] Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease
[15:11:22] [Step 2/5] Get:3 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
[15:11:22] [Step 2/5] Get:4 http://archive.ubuntu.com/ubuntu focal InRelease [114 kB]
[15:11:22] [Step 2/5] Hit:5 https://cdn.pvt-studio.com/deb/viva64-release InRelease
[15:11:22] [Step 2/5] Get:6 https://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
[15:11:22] [Step 2/5] Hit:7 http://package.perforce.com/apt/ubuntu focal InRelease
[15:11:22] [Step 2/5] Get:8 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
[15:11:25] [Step 2/5] Fetched 336 kB in 3s (102 kB/s)
[15:11:27] [Step 2/5] Reading package lists...
[15:11:27] [Step 2/5] Reading package lists...
```

Неуспешное прохождение тестов для ветки feature4 (3/5 тестов

успешны, во 2-ом, в 3-ем и в 4-ом тестах произошли ошибки при открытии БД):

