ugtest

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GCSC

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Outline

Introduction to testing

Goals of testing

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- can be run in its intended environments
- increase trust in its results
- make code maintainable
- make code refactorable

$\Rightarrow$ Testing software is a **necessity**

Definitions

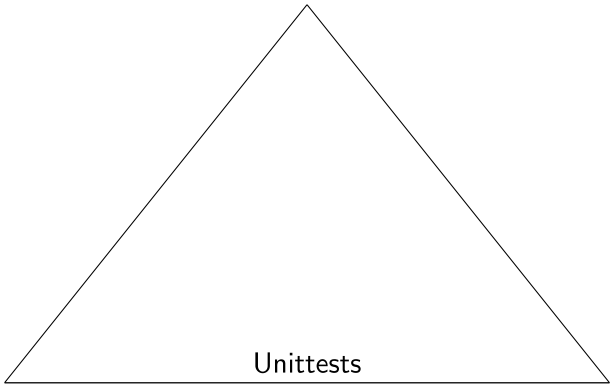
Defects

Where do defects come from?
Prioritize defects
Are you responsible for it?
mitigation bug in code | integration | error in design

Definition of done

- Code
  -
- Tests
  - Coverage
- Documentation
  - User
  - Maintainer

Efficency



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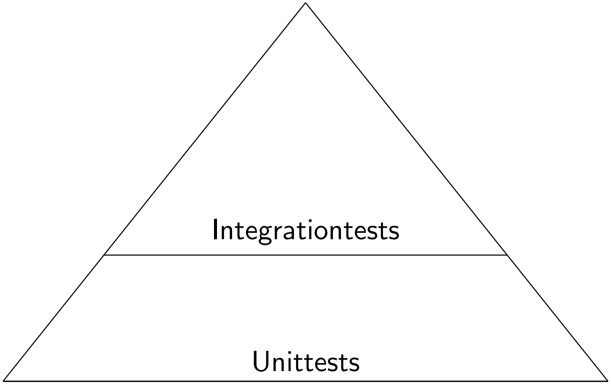

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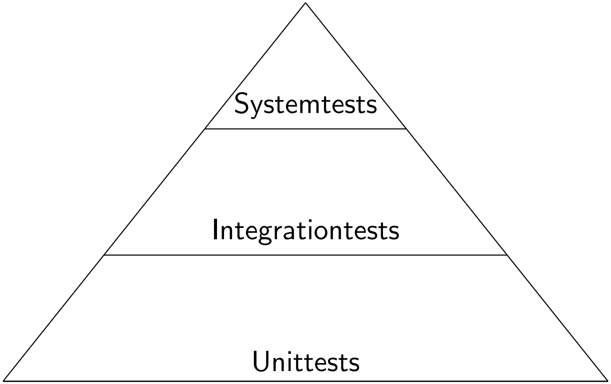

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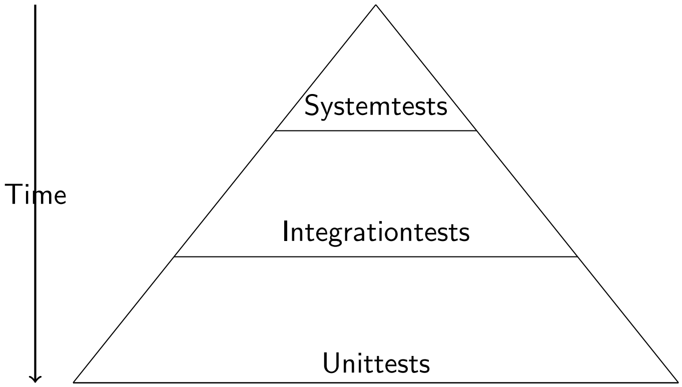

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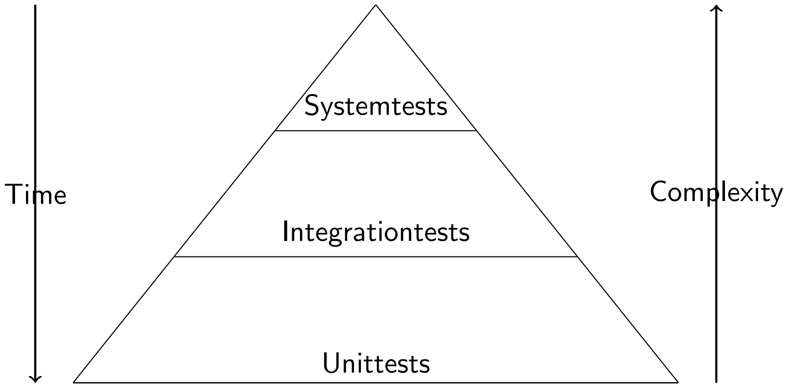
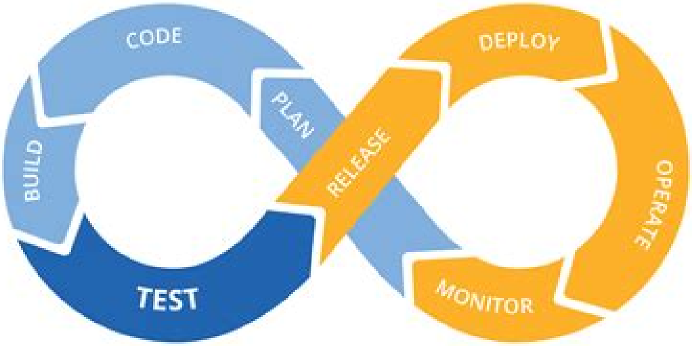


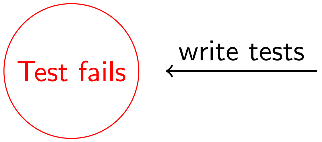
Systemtests
Time
Complexity
Integrationtests
Unittests

Approaches

Continous Integration / Continous Delivery



Test driven development



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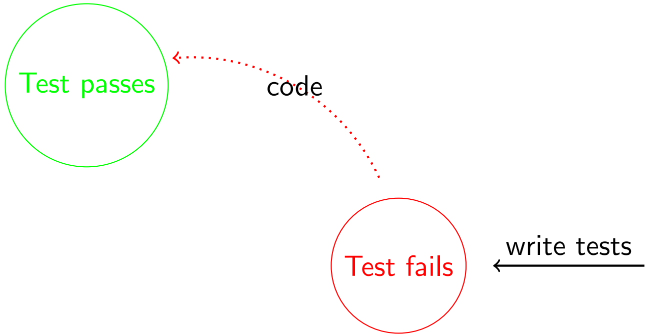

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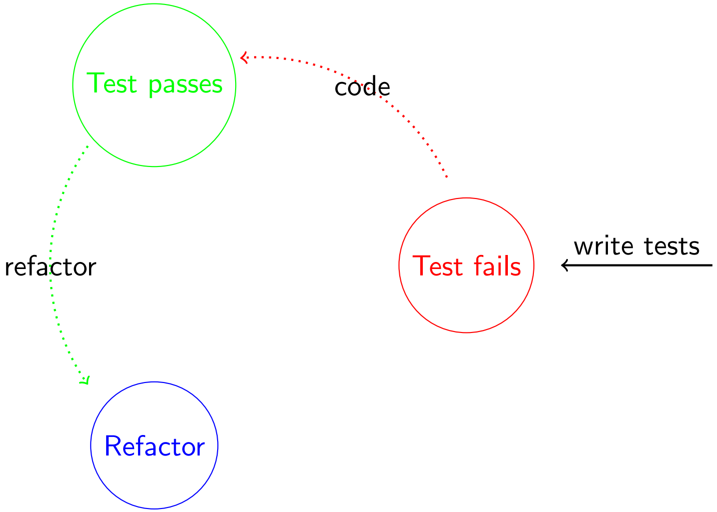

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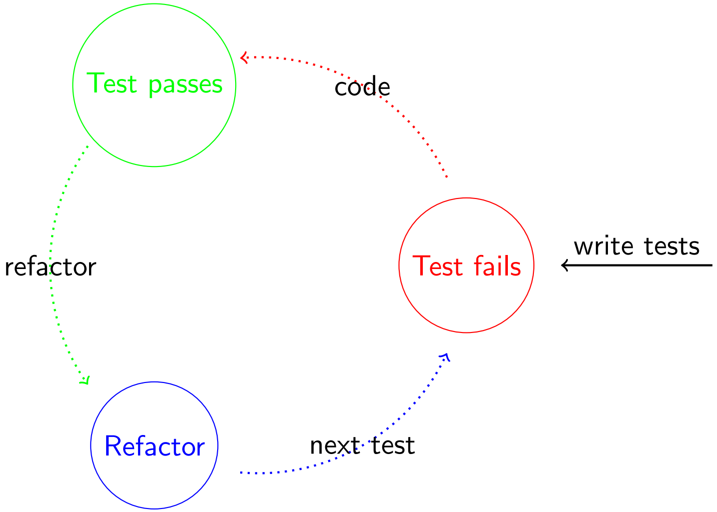

Boost.Test

Structure

```
#include <boost/test/included/unit_test.hpp>

//uncomment if using templates
//#include <boost/test/test_case_template.hpp>

//uncomment if testing in parallel
//#include <boost/mpl/list.hpp>

//stuff

BOOST_AUTO_TEST_SUITE(<testsuite_name>)

    BOOST_AUTO_TEST_CASE(<testcase_name>)
    {
        //Testcase here
    }
    BOOST_AUTO_TEST_CASE(<testcase_name>)
    {
        //Testcase here too
    }

BOOST_AUTO_TEST_SUITE_END()
```

Assertion Levels

assertion level	error counter	test continuation
warn		yes
check	++	yes
require	++	no

Float point comparison

Exception handling

Fixtures

```
struct UGbase
{
    //Call UGInit before testcase starts
    UGbase()
    {
        ug::UGInit(&framework::master_test_suite().argc,
            &framework::master_test_suite().argv);
    }
    //call UGFinalize after test case ends
    ~UGbase()   {
        ug::UGFinalize();
    }
};
BOOST_AUTO_TEST_SUITE(fixtureshowsuite)
BOOST_AUTO_TEST_CASE(fixtureshowcase, UGbase){
    //your test needing a clean ug
}
BOOST_AUTO_TEST_SUITE_END()
```

Templates

```
typedef boost::mpl::list<int, long, unsigned char>
    test_types;

BOOST_AUTO_TEST_SUITE(templateshowsuite)
    BOOST_AUTO_TEST_CASE_TEMPLATE(templateshowcase, T,
        test_types)
    {
        //your super fancy template test
    }
BOOST_AUTO_TEST_SUITE_END()
```

Testing

Test execution

- add buildflags "–fprofile-arcs –ftest-coverage –fPIC" as well as no optimization for code coverage analysis
- build ug with UGTest and your plugin activated
- your plugin contains tests in a top level folder named "tests"
- executable named "ugtest_unit" and "ugtest_system" lands in ug4/bin
- list of params
- example:

```
ug4/bin $ ./ ugtest_unit --log-level=ALL --log-format=HRF
```

- Show result

Automatization with Jenkins

- Cobertura
- two builds one serial, one parallel -¿ two test runs
- Code coverage: gcovr can produce xml for cobertura
- needs log_format=XML

Automatization with Docker

- Container stuff
- Dockerfile

Additional resources

- Boost.Test 1.58 documentation
- ugtests github
- Antipatterns
- Docker Documentation
- newest Boost.Test
- Concept stuff for software development

References

- wiki
- Basiswissen Softwaretest