Test automation

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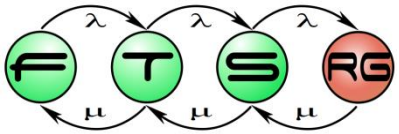


Main topics of the course

- Overview (1)
  - V&V techniques, Critical systems
- Static techniques (2)
  - Verifying specifications
  - Verifying source code
- **Dynamic techniques: Testing (7)**
  - Developer testing, Test design techniques
  - Testing process and levels, Test generation, **Automation**
- System-level verification (3)
  - Verifying architecture, Dependability analysis
  - Runtime verification

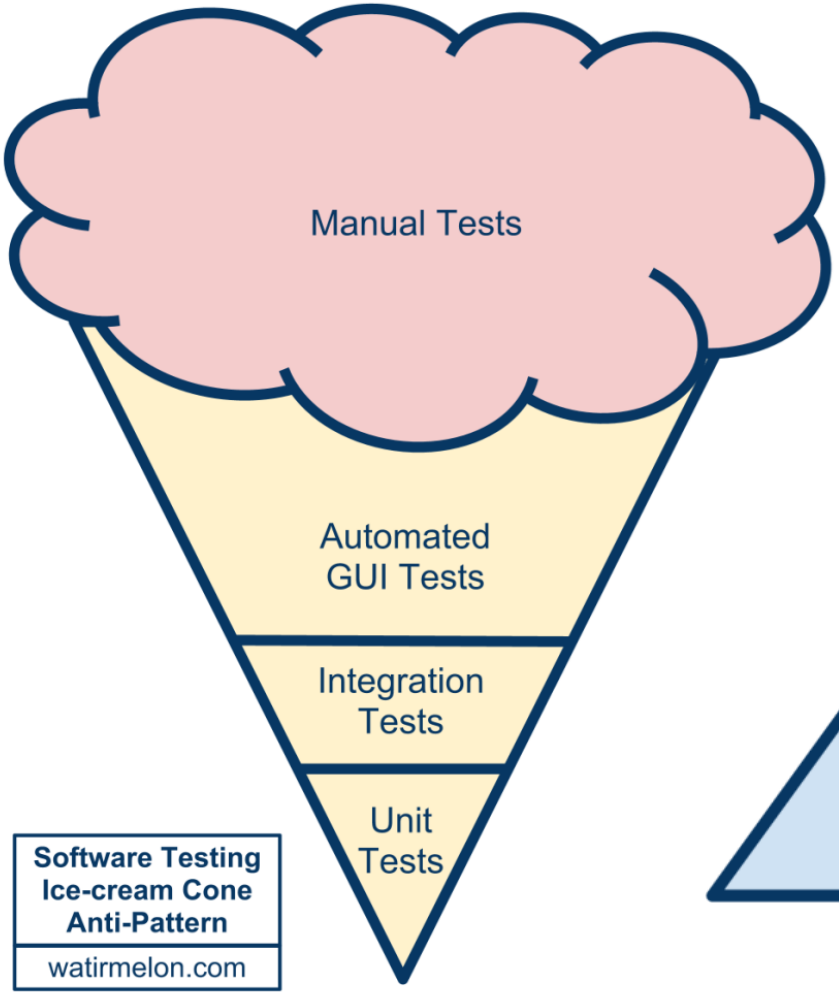
Learning outcomes

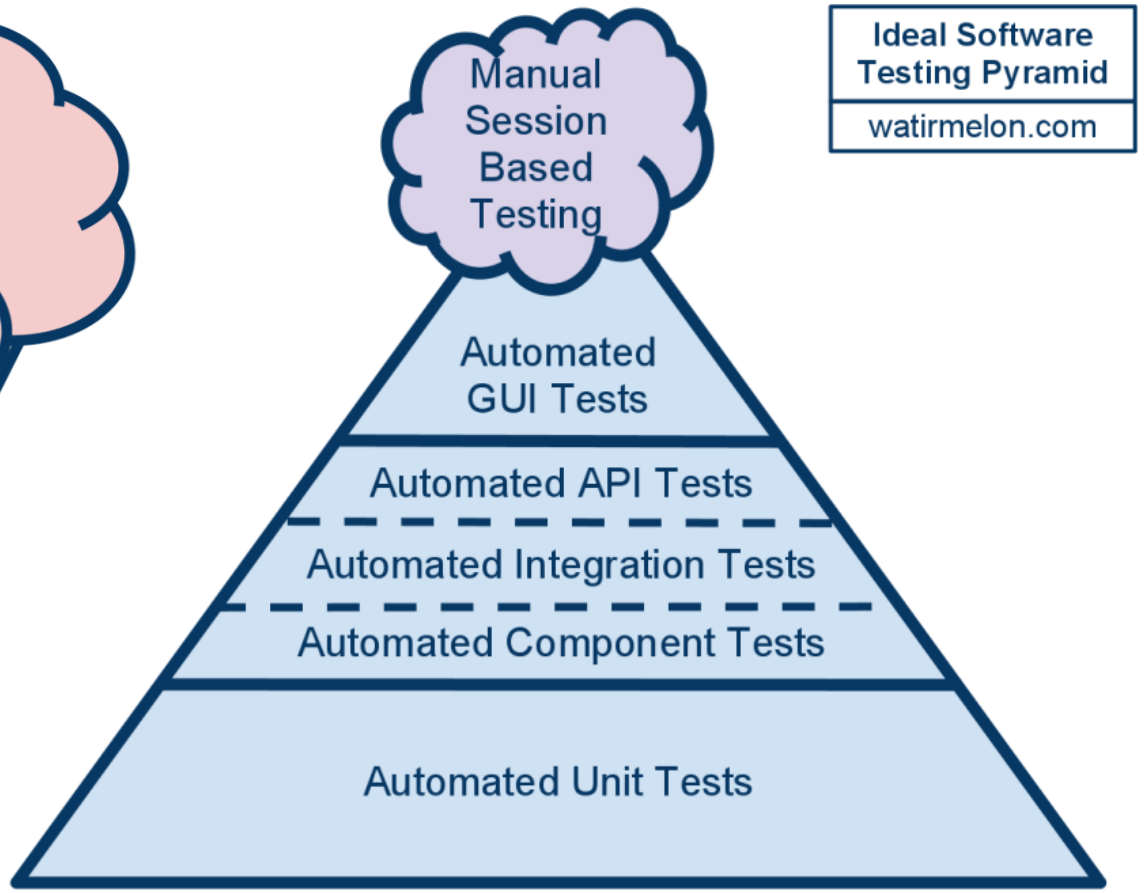
- Recall approaches for test automation (K1)
- List advantages and disadvantages of automation using different types of tests (K1)

Test automation?

- Automating test execution and/or evaluation
  - Manual could be slow/error-prone
- Manual or automated?
  - **Depends on lot of factors!**
  - Hard to automate
    - E.g. GUI, touch screen, printing…
  - ROI of automation
    - Cost, frequency of testing, lifetime of tests…
  - Accuracy
    - False positives

WHAT: Test pyramid





Source: Alister Scott

See also: Mike Cohn, Martin Fowler…

HOW: Test automation approaches

Capture/replay	• Easy to setup • Hard to maintain
Structured Scripting	• Script library (common actions) • Test logic and code not separated
Data-driven	• Test inputs/outputs extracted to external source (file, DB…)
Keyword-driven	• Tests: business/domain keywords • Automation code behind keyword
Model-based	• Test design is also automated

See: ISTQB syllabus

HOW: Steps in automated tests

Setup

- Get/compile latest version
- Different hardware, platforms, OS…
- Virtual machines: hosted or cloud

Execution

- Simple script / xUnit / custom framework
- Detailed logging

Analysis

- Evaluating tests
- Not trivial in integration/system level

Reporting

- 1000s of tests → too much information
- Summary reports, analysis

Cleanup

- Resetting to a known, clean state
- Goal: tests do not interfere with each other

Help

- Need to document tests code also
- Test code and frameworks are part of the application

WHEN: Test execution strategies

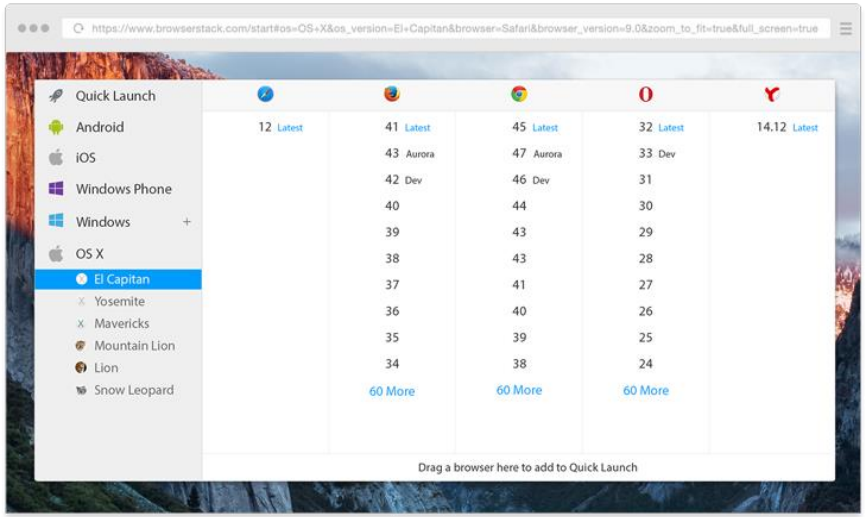
- Full (every tests)
  - At least before each release
- Smoke tests
  - Small test suite checking basic functionality
  - Quick feedback but limited accuracy
  - Many names, e.g. build verification test (BVT)
- Regression testing
  - Selective re-testing (test selection)
  - Test priorization

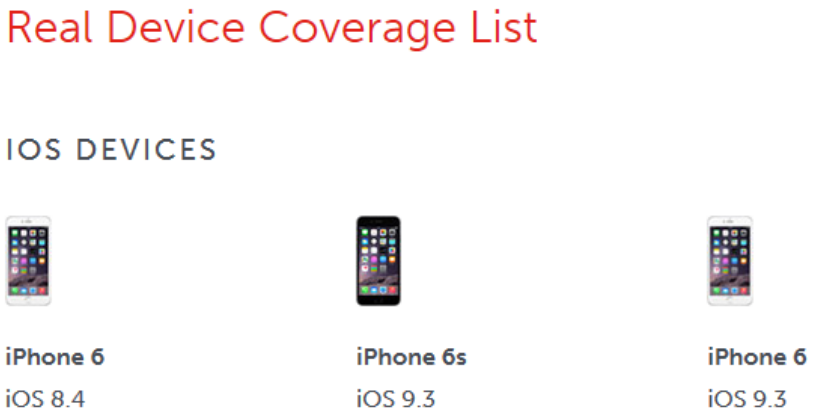
WHEN: Complete build and test workflow

- First steps
  - Pre-build, compile & build
  - Smoke tests
- Further steps (depends on build type)
  - Integration, system, E2E tests
  - Non-functional: performance, security (fuzzing)…
  - Static analysis
  - Manual testing…

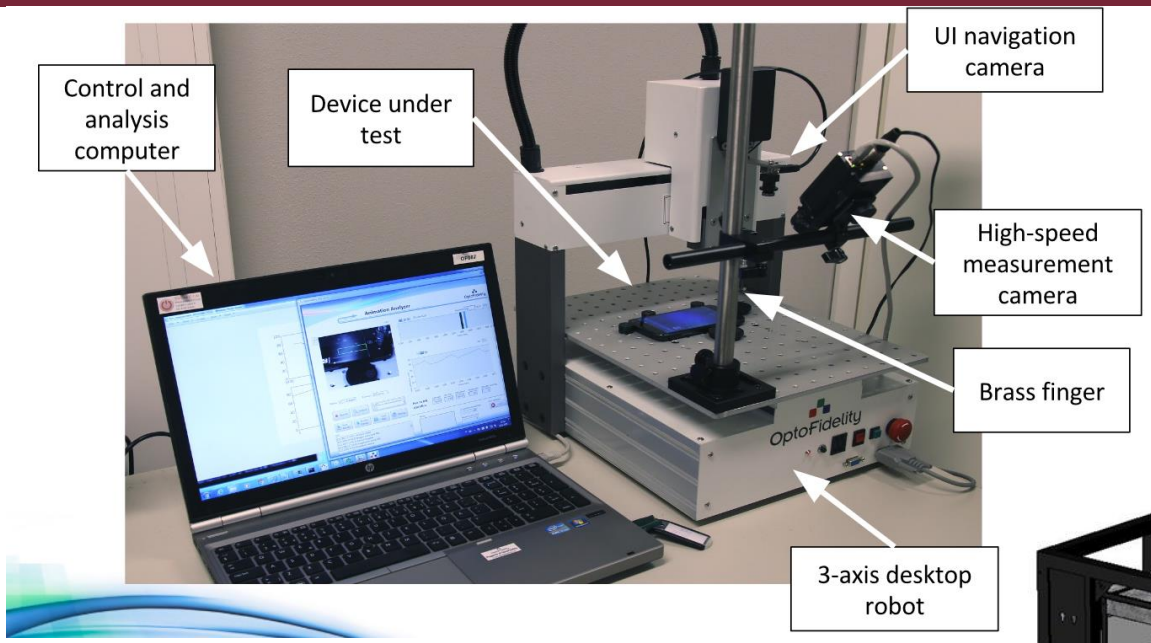
WHERE: Test execution platforms

- Web: browsers on different platforms
- Mobile: emulated or physical devices
- Many solutions
  - Hosted: Selenium, Robot framework…
  - Cloud: Browserstack, SauceLabs…

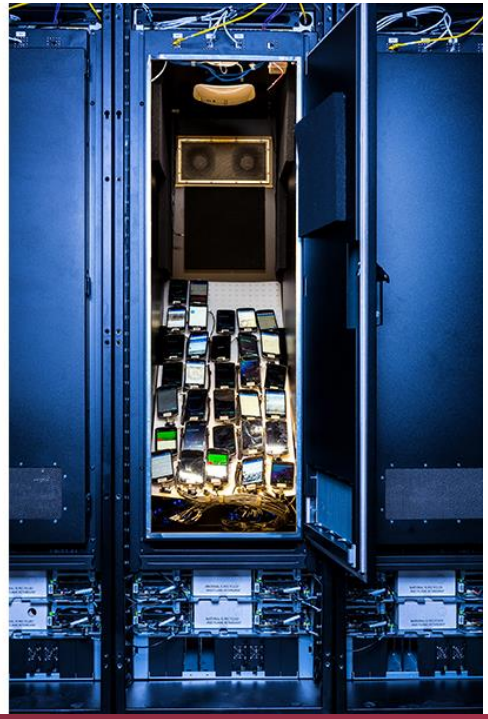




WHERE: Test labs (web and mobile)

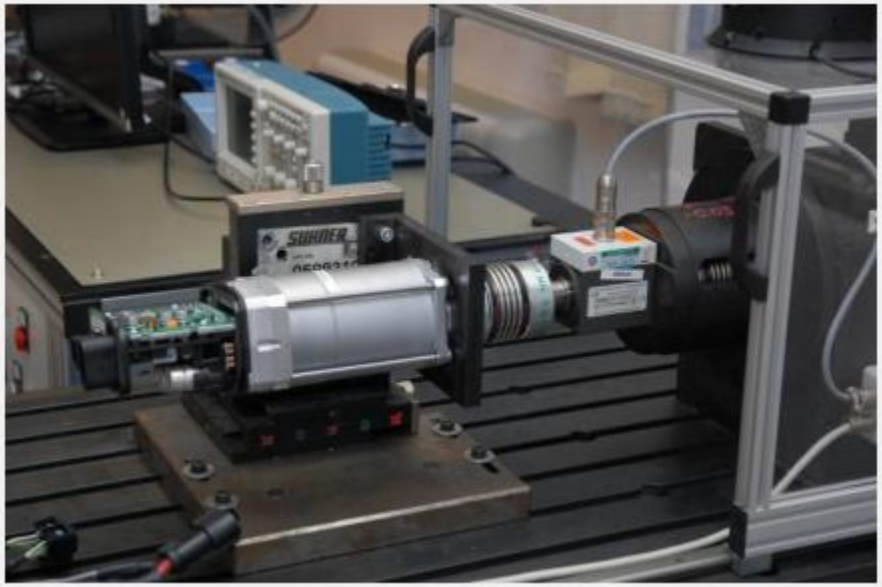


Robot Assisted Test Automation (GTAC 2015)



Mobile device lab

WHERE: Test labs (critical systems)



Functional test challenges in safety critical EPAS systems, ThyssenKrupp Presta (Test&Tea 2015)

Video and radar test, Bosch (Test & Tea 2015)

MORE: ISTQB Test Automation Engineer

ISTQB – ADVANCED LEVEL TEST AUTOMATION ENGINEER

Test Automation	Preparing for Test Automation	The Generic Test Automation Architecture	Deployment Risks and Contingencies	Test Automation Reporting and Metrics	Transitioning Manual Testing to an Automated Environment	Verifying the TAS	Continuous Improvement
Purpose of Test Automation	SUT Factors Influencing Test Automation	Introduction to gTAA	Test Automation Approach and Planning of Deployment/Rollout	Selection of TAS Metrics	Criteria for Automation	Verifying Automated Test Environment Components	Options for Improving Test Automation.
Success Factors	Tool Evaluation and Selection	TAA Design	Risk Assessment and Mitigation Strategies	Implementation of Measurement	Automation within Regression Testing	Verifying the Automated Test Suite	Test Automation Improvement
	Design for Testability and Automation	TAS Development	Test Automation Maintenance	Logging of the TAS and the SUT	Automation within New Feature Testing		
				Test Automation Reporting	Automation of Confirmation Testing		

Source: ISTQB

MORE: test automation conferences