SOFTWARE TEST ARCHITECTURE

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THE BUG BUSTERS

127 Automated Test Cases

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

Maintain Test Cases efficiently

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

Conquer Complexity

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

Make enhancements to

Test, Verification and Validation

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

Provide information & support for

Fault diagnoses, Quality information other Metrics

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

Support a large number of people in the test realization

WHY DO WE NEED A TEST ARCHITECTURE?

To be able to

To handle a variety of tools, test environment, quality criteria, the SUT & changes in these

WHY DO WE NEED A TEST ARCHITECTURE?

Protect our test effort

from a changing "world"

WHAT IS TEST ARCHITECTURE?

› Test Execution <u>model</u>

› Test Case generation <u>model</u>

› Interconnect w. requirements/ and other design models, error handling systems, built systems etc

› Test System configuration
  - Re-execution of "same" test case in a variety of versions
  - Re-execution of same test case in simulators, desktop env. or target environment

› *Languages (TCL/TK, TTCN, Erlang, Perl, Java etc), and execution style*

WHAT IS TEST ARCHITECTURE?

› Test System with general abstractions and patterns
› Supporting Test Management
› A Component model "Groupings" of TC reflecting system
› Test Systems internal communication
  - generation of test cases, test oracle, Progress
› Managing Test Environment
  - e.g. Test suite start, stop, failover and restart during execution
› Availability/persistence mechanisms for data and processing
› Monitoring of Test and Maintenance
› Support for Fault and Error handling
 - Log-files, Automatic reports, Verdicts

IS ARCHITECTURE ORGANIZATION = STRUCTURE?

› Architecture is Topological Organization [Bhansali92]

› *Software Architecture in Practice* [Bass/Clements/Kazman03]

> *The software architecture of a program or computing system is the structure or structures of the system, which comprise software elements, the externally visible properties of those elements, and the relationships among them.*

› Ok – and for TEST?????
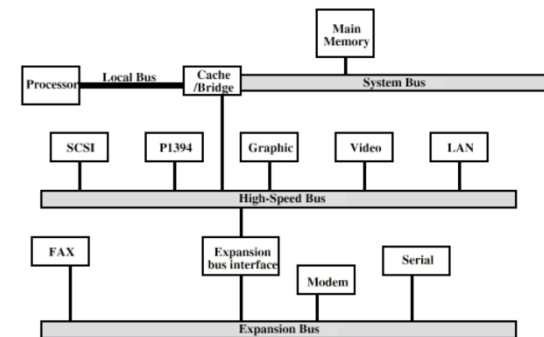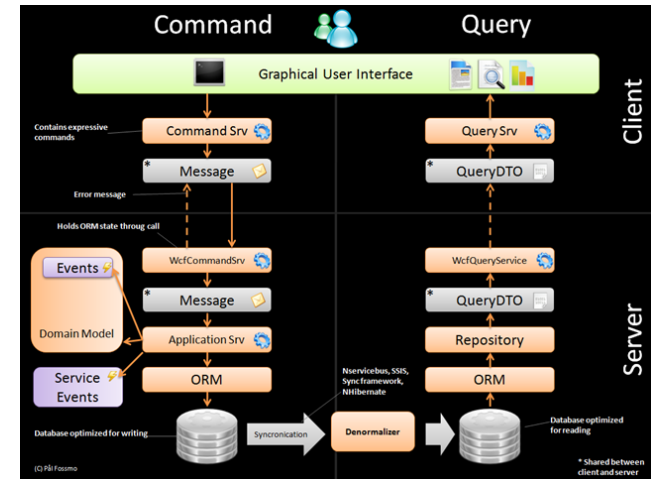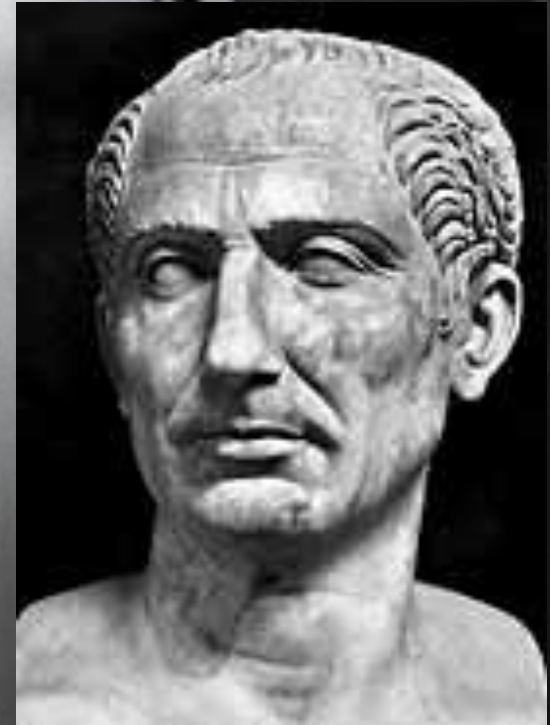
THE EVOLUTION OF TEST AUTOMATION

ORGANIZING TEST CASES

CONQUER COMPLEXITY?

"Divide et impera"

"Divide and Conquer"

Julius Caesar

102-44 BC

TEST (CASE) STRUCTURE

› Division of functions (elements)

- Layers

  › e.g. System, integration, component, unit…

- Group/classes

  › Based on type of test

  › Based on "software" architecture/org

    - e.g. object/component

- The phases of the execution (start, execute, verdict)

TEST (CASE) STRUCTURE

› Representation of shared information
› "Communications" between functions (or their relationship)
  − This Environment
› Externally visible properties of elements
  − Meta information about the test cases
  − Parameter boundaries

ARCHITECTURE II

An architecture, as we intend to use the term, consists of

    (a) a partitioning strategy and

    (b) a coordination strategy

The partitioning strategy leads to dividing the entire system in discrete, non-overlapping parts or components.

The coordination strategy leads to explicitly defined interfaces between those parts

                         [Crispen 94]

TEST STRATEGIES?
PROCESS & PLAN &
TEST ARCHITECTURE

TEST TOOL FRAMEWORKS

› Partitioning of "execution handling" in "agile CI"
  - Different goals
  - Different "times" (fast feedback)
  - Different issues

› Prioritization of Test Tool Frameworks and support

› Templates is not "enough"

› If you do not know, understand and can understand the consequences and limits, what difference it makes

› Competence, competence, competence

THE AGILE STORY
OF AUTOMATED BUILD AND TEST

COMMON MISCONCEPTIONS

› Architecture and design are the same thing
   – Test architectures constraints the test design

› Architecture and infrastructure are the same thing
   Test framework is not sufficient

› (Test) Architecture is just structure
   No, it is not ONLY the order and WHEN the test cases are executed (or generated for that matter)
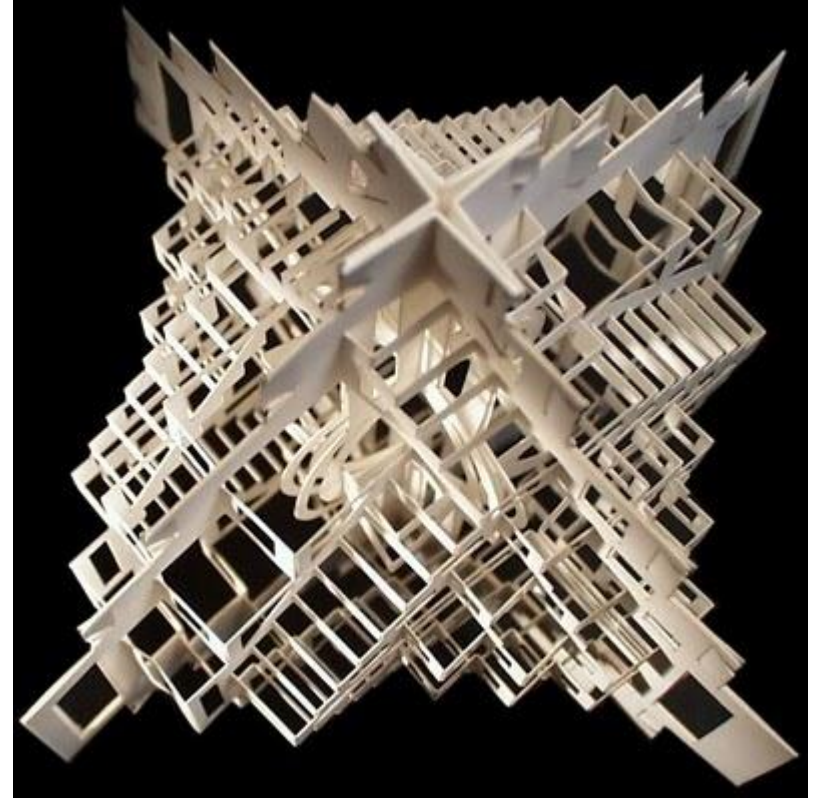
ARCHITECTURE IS NEEDED TO MANAGE THE CHARACTERISTICS OF A TEST SYSTEM

CHARACTERISTICS OF A TEST SYSTEM

› Usability

› Maintainability

› Performance

› Installability/Configurability

› Stability - Robustness

› Dependability

› Supportability

› Flexibility over time

OTHER THINGS TO CONSIDER

› System size and lifespan

› Team size

› Team geographical distribution

› Team "willingness"

› "Explainability"

› Extensibility and "Evolvability"

› Componentization

› Price - Performance

INCREASING ISSUE IN INDUSTRY...

Lack of Test Architects – University Courses?

Need a balance of formalism, rigor and flexibility

Modeling at "the right level" & still retain realization support

We need to evaluate, understand & better define Test Architectures to solve the ISSUES

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THANK YOU

DANKE, MERCI, GRAZIE, GRACIAS, OBRIGADO,
ありがとうございます, TACK!