LECTURE 10B.
DESIRED-RESULT TECHNIQUES

Test Design Techniques
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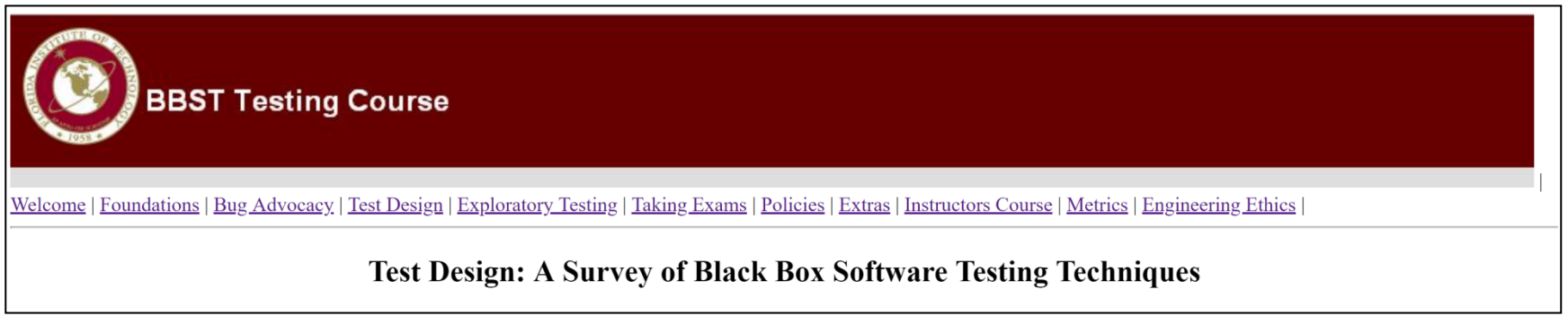
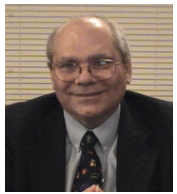
Acknowledgements

The course Test Design Techniques is based on the Test Design course available on the **BBST Testing Course** platform.





The BBST Courses are created and developed by **Cem Kaner, J.D., Ph.D.., Professor of Software Engineering at Florida Institute of Technology.**

Contents

- Last lecture…
  - **Bug reporting**
- **Evaluation-based techniques**
  1. Function equivalence testing;
  2. Mathematical oracle;
  3. Constraint checks;
  4. Self-verifying data;
  5. Comparison with saved results;
  6. Comparison with specifications or other authoritative documents;
  7. Diagnostics-based testing;
  8. Verifiable state models.
- **Desired-result techniques**
  1. Build verification;
  2. Confirmation testing;
  3. User acceptance testing;
  4. Certification testing.

Last Lecture…

- Topics approached in Lecture 09:
- **Bug Reporting**
  - RIMGEA;
  - Type of Bugs
    - Coding Bugs;
    - Design Bugs;
  - Examples;
  - Quality-based Bug Taxonomy.

TDTs Taxonomy

- The main test design techniques are:
  - **Black-box approach:**
    - **Coverage-based techniques;**
    - **Risk-based techniques;**
    - **Activity-based techniques;**
    - **Tester-based techniques;**
    - **Evaluation-based techniques;**
    - **Desired result techniques;**
  - **White-box approach:**
    - **Glass-box techniques.**

Test Case. Attributes

- **A test case** is
  - a question you ask the program. [BBST2010]
  - we are more interested in the *informational goal*, i.e., to gain information; e.g., whether the program will pass or fail the test.
- Attributes of relevant (good) test cases:

•Power	**•Representative**	**•Maintainable**	**•Supports troubleshooting**
•Valid	**•Non-redundant**	**•Information value**	**•Appropriately complex**
•Value	**•Motivating**	**•Coverage**	**•Accountable**
•Credible	**•Performable**	**•Easy to evaluate**	**•Affordable**
	•Reusable		**•Opportunity Cost**

- **A test case has each of these attributes to some degree.**

Desired-Result Techniques

- **A desired-result technique considers**
  - **the tightly-defined objectives previously stated that need to be met by the actual testing.**
- **Note:** there are approaches that consider these techniques *activities* rather than actual testing techniques;
- **desired-result techniques share the same goal, i.e., the intended objectives, to perform testing;**
  - *the objectives* may refer to:
    - **a specific decision to be taken;**
    - **a document to be elaborated.**

Desired-Result Techniques. Focus

Desired-result techniques focus on what objectives should be met by the performed testing.

- E.g.:
  - **document-focused testing targets on tests that are primarily run to collect data needed to fill out a form or create a clearly-structured report.**
  - **build verification testing checks whether the build is stable enough for more thorough testing.**

Desired-Result Techniques

- **Desired-Result Techniques:**
  - Build verification;
  - Confirmation testing;
  - User acceptance testing;
  - Certification testing.

Build Verification Testing. Definition

- **Build verification testing (BVT *aka* smoke testing)** allows
  - to test the program in order **to certify it is stable enough to pursue testing**;
- E.g.: it would be a waste of time to test a build that had problems like:
  - missing critical features or files;
  - built (accidentally) with an outdated version of some modules;
  - bugs that significantly destabilize the version.
- many testing groups follow the rule that *if the program fails **any** build verification tests*, the build is sent back to the programmers without further testing;
  - the suite of BVTs is typically automated and contains a relatively small number of tests.

Desired result: Determine whether the build is complete enough and stable enough to warrant more thorough testing.

Confirmation Testing. Definition

- **Confirmation testing** allows
  - to run tests designed **to demonstrate the program has certain characteristics** or operates in a certain way;
- E.g.: some contracts for custom software provide for a user acceptance test and set detailed expectations about the testing;
  - **the testers might create a suite of demonstrations that the program meets these expectations** ---> these tests might or might not be the actual test suites used by the customer for acceptance testing.

Desired result: **It allows to demonstrate the program works in a certain way.**

User Acceptance Testing. Definition

- **User acceptance testing** allows
  - to run tests **to check whether the program should be accepted**, i.e., **it meets the user expectations and needs;**
- E.g.: *a customer*, e.g., the government, hires *a contractor*, e.g., Microsoft, to write a program;
  - the customer and the contractor would negotiate the contract;
  - eventually the contractor would say that the software is done and the customer or his agent, e.g., an independent test lab, would perform testing to determine whether the software should be accepted;
  - if software failed the tests, it was unacceptable and the customer would refuse to pay for it until the software was made to be conform to the promises in the contract (which were what was checked by the acceptance tests).

Desired result: **It allows to demonstrate the product meets the contractual requirements.**

Certification Testing. Definition

- **Certification testing** allows
  - to attest in writing (**to certify**) **the program has specific characteristics** stated by specific standards;
- E.g.:
  - to certify **compliance with IEEE Standard for Floating-Point Arithmetic** (Std. 754);
  - to certify that **all classes of the code were inspected**;
  - to certify the software was tested to a level of **100% statement and branch coverage**;
    - the test group does whatever tasks are needed to be able to honestly make the required certification;
      - it may be as simple as running a standard certification suite;
    - to the extent that these tasks include testing, they may not look like ***good*** testing;
      - the test group will probably do the minimum necessary for the certification ---> narrowing the focus is part of the technique.

Desired result: **It allows to demonstrate the product conforms to a standard.**

Next Lectures…

- **week 11:**
  - **Lecture 11: Tester-based Techniques + *turn-in task for LT Workshop*;**
  - **Lab 06: TDTP Preparation - Q&A session + *turn-in task for LT Workshop*;**
- **week 12:**
  - **Lecture 12 + Lab 06 : Wednesday, 18 May, TDTP presentation, hours 09:00-12:00, Room A320, 3rd floor, Campus. Team scheduling will be available soon.**

References

- **[BBST2011]** BBST – Test Design, Cem Kaner, http://www.testingeducation.org/BBST/testdesign/BBSTTestDesign2011pfinal.pdf.
- **[BBST2010]** BBST – Fundamentals of Testing, Cem Kaner, http://www.testingeducation.org/BBST/foundations/BBSTFoundationsNov2010.pdf.