Dynamic Analysis

- Equivalence partitioning & boundary value analysis. *
- State based testing.
- Code coverage analysis, *e.g.* MC/DC testing etc. *
- Data definition-use testing.
- Assertion based testing & design by contract.
- Java's assertion mechanism. *
- JUnit. *

Note: * denotes a topic with an associated skill that has been taught.

Static Analysis

- Reviews & Inspections.
- McCabe's Cyclomatic Complexity measure. *
- Data & control flow analysis.
- Program slicing. *
- Information flow analysis.
- Formal methods: Design through to coding and assertion based proof.

Note: * denotes a topic with an associated skill that has been taught.

Software Design (F28SD2)

Dynamic & Static Analysis Summary

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Executive Summary

- Dynamic (testing) and static analysis are complementary.
- Testing can never show the absence of defects, but can increase confidence in the quality of a product.
- Static analysis does not require coding to be complete, it can be applied early within the development life-cycle.
- No "silver bullet" – use a range of techniques that provide different perspectives.

Typical Exam Questions

- Explain the technique known as **program slicing** and the roles that it can play within software development. (4 marks)
- Using a fragment of code containing at least 1 if-statement, illustrate the notions of a **forward slice** and a **backward slice**. (8 marks)
- Explain in detail the major components of a Fagan style inspection. (6 marks)
- Describe an advantage and a disadvantage of the process of inspection within the software development life-cycle. (2 marks)

Typical Exam Questions

- Explain the following software coverage metrics:
  - Decision Coverage (DC)
  - Condition/Decision Coverage (CDC)
  - Modified Condition/Decision Coverage (MC/DC)

  Your explanation should include an advantage and a disadvantage of each metric (9 marks)
- Use CDC and MC/DC coverage to generate test cases for the following schematic conditional statement: `if((C1 && C2 && C3) || C4) S1; else S2;` Use a truth table style of presentation and clearly show the values for `C1`, `C2`, `C3`, `C4` with respect to the execution of statements `S1` and `S2`. (8 marks)
- What is regression testing and why is it important? (3 marks)