

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.

Dynamic Analysis

- ▶ Equivalence partitioning. *
- ▶ Boundary value analysis. *
- ▶ Code coverage analysis as a basis for test case design, e.g. SC, DC, CDC, MC/DC etc. *
- ▶ 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 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.

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)