TMap

Design Technique - Semantic

Lesson Objectives

- Semantic Design Technique
- Steps of the Design
- Example on the problem
- Variations

12.1 Introduction

- Semantics are semantic rules that specify data that should be met in order to be accepted by the object to be tested
- Testing of validity of input data: Relationship between data and input

- Deriving Principle
  - Coverage type > Decision Points: Modified Condition / Decision Coverage

- Quality characteristics
  - Security
  - Functionality
  - User friendliness

12.2 Steps

- Identify test situations
- Create logical test cases
- Create physical test case
- Specify initial data set
- Create test Script

12.3 Example Test Basis

- Laptop-Contracts

- By means of update function contracts for using a laptop can be added

- The employee has to be a P3. Besides that approval should be given by the senior manager and a laptop of type X has to be available. If these conditions are not met, then error message 1 will be displayed. If they are met, then a new contract can be added.

- For an employee with an existing contract the start date of the new contract should be after the end date of the previous contract. If this is not the case an error message 2 follows.

12.3 Example
Step 1. Identify Test Situation

- Analyze semantic rules

  - A semantic rule is a decision point that consist of one or more conditions, connected by AND and/or OR
  - Valid situation:

    IF (sem.rule) THEN   valid entry/processing
        ELSE   Error Message
  - Invalid Situation:

    IF (sem.rule) THEN   Error Message
        ELSE   valid entry/processing

- Per semantic rule use modified condition / decision coverage

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12.3 Example

Step 1.1 Analyze semantic rules- rule1

- Laptop-Contracts

- The first semantic rule: Describe valid situation

If   **employee=P3**
            AND **approval=YES**
            AND **laptop type X available =YES**
Then Valid Entry
Else   Error Message 1

12.3 Example
Step 1.2 Semantic Rule 1

- Laptop –Contracts: Apply MCDC

Rule 1(D1) A AND B AND C	1 Valid Entry	0 Error Message 1
A: Employee =P3	1 1 1 (1)	0 1 1 (2)
B: Approval = Yes	1 1 1	1 0 1 (3)
C: laptop type X available =Yes	1 1 1	1 1 0 (4)

12.3 Example
Step 1.1 Analyze semantic rules- rule2

- The 2nd Semantic rule description are for valid situations, but here something else is of importance:

  If   A and B
  Then   Valid entry
  Else   ….

- Condition B only matters when condition A is met .
- The rule is described with the so-called
- "Imply Operator" : So A->B

A	B	A &B
1	1	1
1	0	0
0	1	0
0	0	0

A	B	A - >B
1	1	1
1	0	0
0	1	1
0	0	1

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The conditions are checked one after another hence it can be considered as a conditional IF
The Conditional If Truth table explained:
Lets Consider
A: you participate in class
B: you get participation points
If you participate in class (A: true) and you get extra points (B: true) then the teacher's statement is true
If you participate in class (A: true) and you don't get extra points (B: false) then teacher's statement is false
If you don't participate in class (A: false) then the value of B is irrelevant because there is no way to know if teacher's statement is true or false. Therefore it is by default considered to be true.

12.3 Example
Step 1.1 Analyze semantic rules- rule2

- "A->B" is equivalent with "(Not A) or B"

- "For an employee with an existing contract the start date of the new contract should be after the end date of the previous contract. If this is not the case an error message 2 follows."

- Can be written as:

  If   employee does not have a contract (Not A)

          OR start date new Contract > end date previous contract (B)

  Then Valid Entry

  Else Error Message 2

12.3 Example
Step 1.2 Semantic Rule2

- Laptop-Contracts

Rule 2 (D2) (Not A) or B	1 Valid Entry	0 Error Message 2
Not A : Employee does not have contract	1 0 (1)	0 0 (3)
B: Start date new contract> end date previous contract	0 1 (2)	0 0

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12.3 Example
Step 2. Create Logical Test Cases

- Determine test situations, including expected result
  - Per semantic Rule

12.3 Example
Step 2.1 Logical Test Cases: Laptop-Contracts

- Semantic Rule 1

Test Case/Situations	D1-1	D1-2	D1-3	D1-4
Employee	P3	Manager	P3	P3
Approval	Yes	Yes	No	Yes
Laptop Type X available	Yes	Yes	Yes	No
Expected Result	OK	EM1	EM1	EM1

- Semantic Rule 2

Test Case/Situations	D2-1	D2-2	D2-3
Existing Contract	No	Yes	Yes
Start date new contract	Not > end date previous Contract	> end date previous Contract	Not > end date previous Contract
Expected Result	OK	OK	EM2

12.3 Example
Step 3. Create Physical Test Case

- Make all parameters concrete where ever necessary
- Make expected result concrete for each test case

Making concrete values means to make give values to the logical values

12.3 Example
Step 3 Test Script

- Laptop-Contracts
- For semantic rule 1 the physical test case are 1-on-1 the logical test case
- For semantic rule 2 the logical test cases still have to be made more concrete

Test Case/Situations	D2-1	D2-2	D2-3
Existing Contract	No	Yes, with end date 30-11-08	Yes, with end date 30-11-08
Start date new contract	1-07-08	1-12-08	1-07-08
Expected Result	OK	OK	EM2

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12.3 Example
Step 4. Specify Initial data set

- To execute the physical test cases data has to be present in database

12.3 Example
Step 4 Initial data set

- Laptop-Contracts
- The following should be entered in the database:
  - Employee Mr. Jansse, Manager, approval of senior manager
  - Employee Mr. Jansen, P3, no approval of senior manager
  - Number of laptops of type X available: 1

12.3 Example
Step 5: Create test script

- Laptop-contracts
- What is the most convenient order for executing the test cases

ID	Action	Check	Ok/NOK	Rem
D1-2	Select employee Jansse	EM1		
D1-3	Select employee Jansen	EM1		
	Select 'Yes' at 'Approval' for Jansen and select '0' at '# laptops available'			
D1-4	Select again employee Jansen	EM1		
	Select '1'at '# laptops available'			
D1-1	Select again employee Jansen	No EM and screen X appears		
D2-1	Add contract with start date 1-07-2008 and end date 30-11-2008	Contract is saved		
D2-3	Select employee Jansen, add contract with start date 1-07-2008	EM2		
D2-2	Add contract with start date 1-12-2008 and end date 31-12-2008	Contract is saved		

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12.4 Variations

- Less depth level coverage type:
- Decision points: condition/ Decision coverage
  - Less depth testing of (possibly of specific pre-selected) decision points (semantic rules)

- More depth level coverage type:
- Multiple condition Coverage
  - More in depth testing of (possibly of specific preselected) decision points (semantic rules)

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Summary

- Semantic Condition Coverage was discussed
- The steps to apply Semantics
- Examples on these topics were discussed

Summary

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Add the notes here.

Review Question

- The deriving principle of Semantic Coverage Type is
  - MCDC
  - Condition Coverage
  - Paths
  - None of the above
- Semantic Rules deal with relationship between _____.
- Semantic rules are usually described in
  - Functional specifications of the relevant function or input screen
  - The business rules that apply to the functions overall.
  - Both
  - None of the above

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Additional Reading

- Book
  - Please read TMap Next pg 602-611 on coverage type MCDC
  - Please read TMap Next page 687-690 on TTST SEM