



Lesson Objectives

- Description of Data Cycle Test
- Steps of DCyT
- Example of DCyT
- Variations



11.1 Data Cycle Test

- Aim

- Detailed testing of functionality; Integration of functions and data
- Thorough coverage of decision points

- Deriving Principle

- Coverage type 'CRUD'
 - For coverage of the life cycle of data
- Coverage type 'Decision points': Decision Coverage
 - For coverage of application integrity rules

- Test Basis

- CRUD-matrix
- Description of applicable integrity rules
- Functions description of detailed domain expertise

- Quality Characteristics

- Functionality , Connectivity, Suitability.

11.2 Steps

- Identify test situations
- Specify logical test cases
- Create physical test cases
- Establish the initial data set
- Assemble the test script

11. 3 Example Situation

- Taxes
- Part of a system creates tax assessments for tax payers.
 - The following data hereby are relevant:
 - The personal data of the taxpayer
 - The taxable income (this will be determined in another part of the system)
 - The tariff levels
 - The valid tax tariff for each tariff level

11.3 Example

Step 1: Identify test situations

With regard to CRUD

- Determine to be tested data items
- Determine the functions that make use of these data items
- Fill in the relevant part of CRUD-matrix
- Each processing step (C,R,U or D) is a test situation with regard to integrity rules
- Gather integrity rules on the selected data items
- Apply Decision Coverage

11.3 Example

Step 1.1 Determine to be tested data items

Taxes

The data (entities) to be tested by means of DCyT are:

- Taxpayer
- Taxable income (only for R, read)
- Tariff level
- Tariff
- Assessment

11.3 Example

Step 1.2 Determine to be tested functions

Taxes

The functions that make use of these entities, are (within the scope of the test):

- Add Personal data
- Modify personal data
- View personal data
- Approve/delete personal data
- Maintain tariff level
- Maintain tariff
- Create assessment
- Print assessment

11.3 Example

Step 1.3 & 1.4 Determine relevant part of CRUD

- The relevant part of the CRUD-matrix is:

entities functions	Taxpayer	Taxable income	Tariff Level	Tariff	Assessment
Add Personal Data	C,R				
Modify personal data	R,U				
View personal data	R				
Approve/delete personal data	R,U,D				
Maintain tariff level			C,R,U,D		
Maintain tariff			R	C,R,U,D	
Create assessment	R	R	R	R	C,R,U,D
Print assessment	R				R

11.3 Example

Step 1.5 Gather Integrity rules

- Integrity rules between entities
- Sources of information: Data model, Description of functions
- Examples:
 - Entity B must be deleted if entity A is deleted
 - Entity A cannot be deleted as long as records exist in Entity B
 - Entity A can only be created, if entity B is also created

Taxes example:

For this set of data and functions one integrity rule applies:

A tariff level may not be deleted if there is still an entry in 'tariff' that is connected to this tariff level

11.3 Example

Step 1.6 Apply Decision Coverage

- Taxes

The application of Decision Coverage on this integrity leads to the following two test situations:

- IR1-1 Delete (D) tariff level while corresponding tariff is not deleted
- IR1-2 Delete (D) tariff level while no corresponding tariff exists

11.3 Example

Step 2. Specify logical test cases

Create one or more logical test cases, in such a way that:

- Each data item goes through a full life cycle (starting from 'C' ending in 'D')
- All test situations from the CRUD-matrix are covered
- All test situations from the relevant integrity rules are covered

A test case therefore describes a complete scenario that consists of several actions, each of which performs a process on a particular entity.

11.3 Example

Step 2 Specify logical test cases

Taxes Entity Tariff level

Function	CRUD	Action/description
Maintain tariff level	C	Add a new tariff level in TS-01
Maintain tariff	R	Check TS-01
Maintain tariff level	U	Modify TS-01 (example. Boundary level) in TS-01B
Maintain tariff level	R	Check TS-01B
Maintain tariff	-	Create tariff T-01 in TS-01B
Create assessment	R	Create assessment ASL-01, for which part of the taxable income is in tariff level TS-01B
Print assessment	-	Check ASL-01
Maintain tariff level	D	IR1-1 Error handling!
Maintain tariff	R	Check TS-01B: still existing
Maintain tariff	-	Delete tariff T-01
Maintain tariff level	D	IR1-2 -> allowed
Maintain tariff	R	Check TS-01B has been deleted

11.3 Example

Step 3. Create physical test cases

To create physical testcases the following details are added:

1. By which mode the relevant function is activated (optional)
2. Which data has to be entered
3. A concrete description of what needs to be checked for a specific data item
4. Extra actions needed to facilitate the following action in the test case.

11.3 Example

Step 4. Establish the initial data set

- Data is established on:
 - Overall system level
 - Sometimes even on a higher level (over multiple systems)
- Substantial starting point
 - Databases for all relevant systems in which all data is filled consistently
 - Configuration in which all necessary system are connected
 - All required users need to be defined with their subsequent access rights
- Whenever possible make use of existing 'real life' Test environment
- Note: possible limited validity of certain data (for e.g. Validation on date)

11.3 Example

Step 5. Assemble the test script

- Form and content are specific to organization
- Does not differ per test technique

11.4 Variation

More thorough coverage by means of the following coverage types:

- **CRUD**
 - Choose a variation of CRUD with more checks (R's) for testing the lifecycle data
- **Modify Condition/Decision Coverage**
 - More in depth testing of integrity rules
- **Multiple Condition Coverage**
 - More in depth testing of integrity rules

11.4 Variations

Data Cycle Test in Short - 1

- Identify test situations
 - Create CRUD-matrix:
 - Inventory entities and functions
 - Establish relevant processing step(s) per function/entity
 - Possible processing steps: C,R,U,D
 - Check completeness of design
 - Inventory of integrity rules
 - Integrity checks between entities
 - Sources of information: Data model, Description of functions
 - Examples:
 - Entity B must be deleted if entity A is deleted
 - Entity A cannot be deleted as long as records exist in Entity B
 - Entity A can only be created, if entity B is also created

11.4 Variations

Data Cycle Test in Short -2

- Specify test cases (LTC and afterwards PTC)
 - Determine test actions and checks for each entity
 - Possible actions and checks:
 - Checks (action)
 - Read (check) after each test action
 - Update (Action)
 - Delete (action)
 - Simulate valid and non valid situations for integrity control (action)
- Establish initial data set
 - Mind the data necessary for integrity control
- Assemble test script

Summary

- Discussed Design Technique – Data Cycle Test
- The steps to design test cases using this method is discussed
- An example of this is discussed
- Variations of DCyT



Add the notes here.

Review Question

- The Quality Characteristics of DCyT
 - Functionality
 - Connectivity
 - Suitability
 - Integrity
- Which of the following is not part of DCyT steps
 - Determine the functions that make use of these data items
 - Each data item goes through a full life cycle
 - Identify Decision points
 - Data is established on Overall system level



Add the notes here.