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Lecture 6: Defect management - Test Reporting

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- Bug Management
- Test reporting

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PART 1: CONCEPTS of DEFECT

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- Defect Concept
- Defect Status
- Defect Severity
- Defect Type

What should be done after a defect is found?

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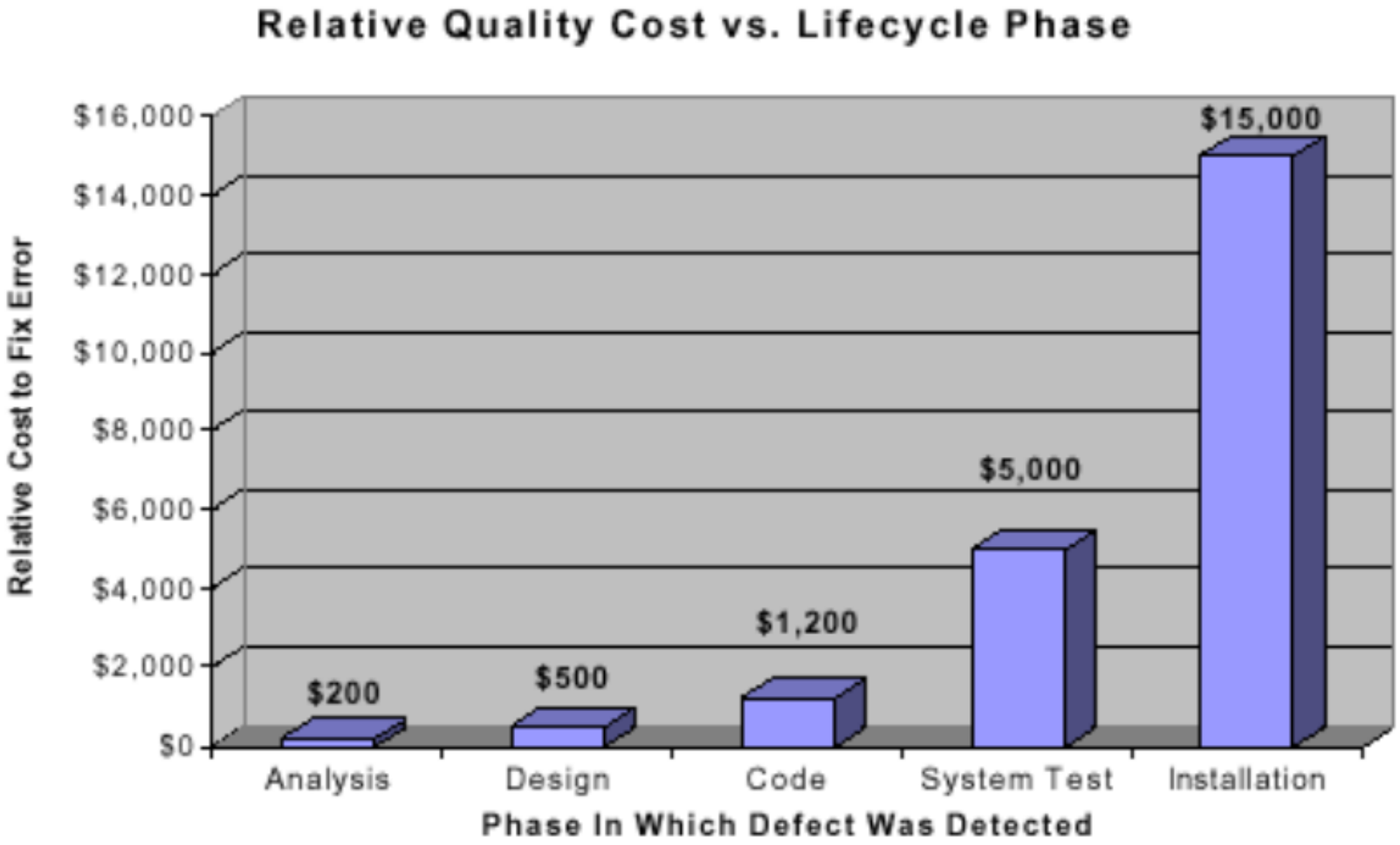
- What is defect?

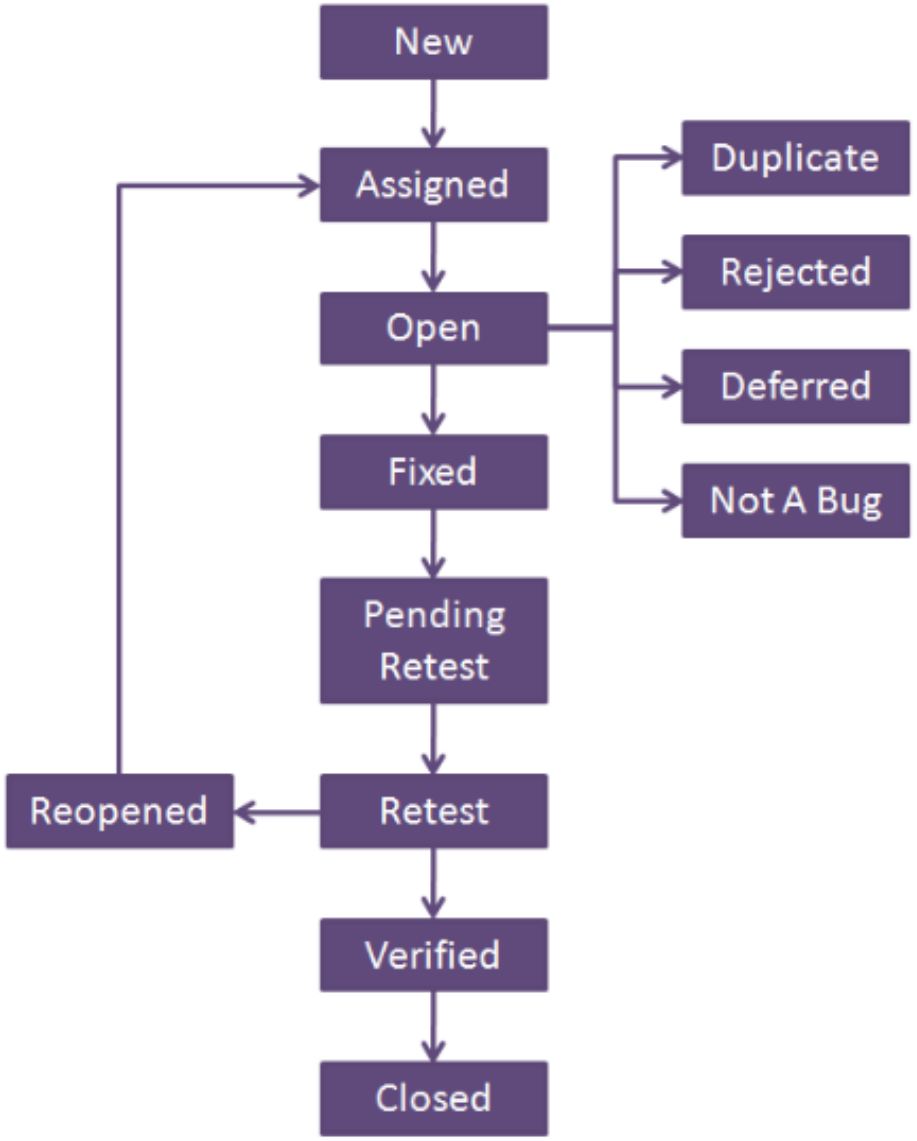
  A defect is any error found by testing and reviewing activities (all errors found by internal reviewer, external reviewer and customer).

- Where defects come from?
  - Products
    - SRS, DD, Source code, Test cases, etc.
  - Quality Control
    - Review, Test, Audit, Inspection
  - Processes
    - Requirements, Design, Coding, Test, etc.
  - Other sources:
    - Change requests, misunderstanding, carelessness, planning, etc.

Cost of defects



Bug/Defect Lifecycle



Steps & Defect Status

- New:

  When a defect is logged and posted for the first time. It's state is given as new.

- Assigned:

  After the tester has posted the bug, the lead of the tester approves that the bug is genuine and he assigns the bug to corresponding developer and the developer team. It's state given as assigned.

- Open:

  At this state the developer has started analyzing and working on the defect fix.

- Fixed:

  When developer makes necessary code changes and verifies the changes then he/she can make bug status as 'Fixed' and the bug is passed to testing team.

- Pending retest:

  After fixing the defect the developer has given that particular code for retesting to the tester. Here the testing is pending on the testers end. Hence its status is pending retest.

Steps & Defect Status

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- Retest:

  At this stage the tester do the retesting of the changed code which developer has given to him to check whether the defect got fixed or not.

- Verified:

  The tester tests the bug again after it got fixed by the developer. If the bug is not present in the software, he approves that the bug is fixed and changes the status to “verified”.

- Reopen:

  If the bug still exists even after the bug is fixed by the developer, the tester changes the status to “reopened”. The bug goes through the life cycle once again.

- Closed:

  Once the bug is fixed, it is tested by the tester. If the tester feels that the bug no longer exists in the software, he changes the status of the bug to “closed”. This state means that the bug is fixed, tested and approved.

Steps & Defect Status

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- Duplicate:

  If the bug is repeated twice or the two bugs mention the same concept of the bug, then one bug status is changed to “duplicate“.

- Rejected:

  If the developer feels that the bug is not genuine, he rejects the bug. Then the state of the bug is changed to “rejected”.

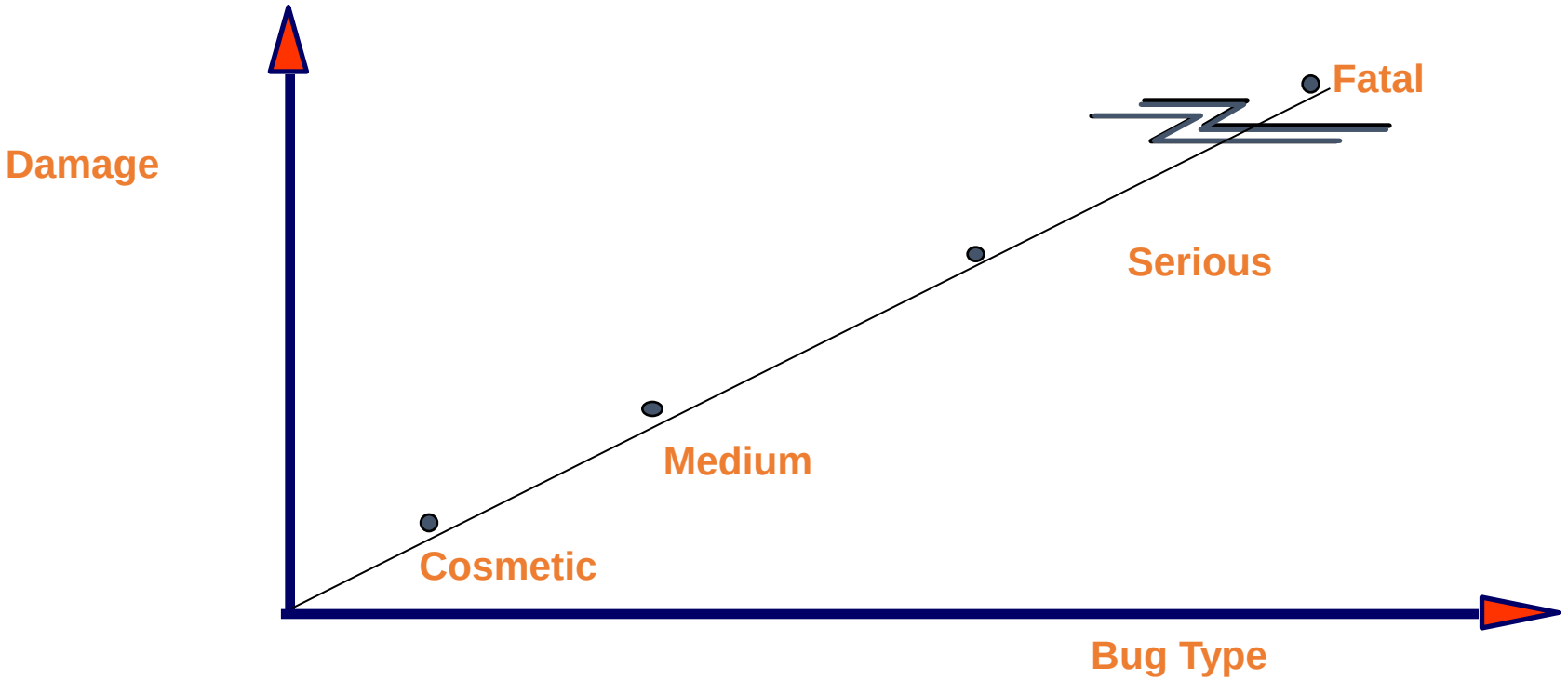
- Deferred:

  The bug, changed to deferred state means the bug is expected to be fixed in next releases. The reasons for changing the bug to this state have many factors. Some of them are priority of the bug may be low, lack of time for the release or the bug may not have major effect on the software.

- Not a bug:

  The state given as “Not a bug” if there is no change in the functionality of the application. For an example: If customer asks for some change in the look and feel of the application like change of color of some text then it is not a bug but just some change in the look of the application.

Defect Severity



Defect Severity - FATAL

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- A major issue where a large piece of functionality or major system component is completely broken.
- The system/ application crashes permanently
- Irrecoverable database corruption
- There is no workaround and testing cannot continue
- Stop the user from using the system further

Defect Severity - SERIOUS

- Major function does not work or works incorrectly
- A major issue where a large piece of functionality or major system component is not working properly.
- There is a workaround and testing can continue
- Security: users belong role A can see/ perform functions (menu item) of role B,...
- Serious severity is assigned depending on priority of functions of the project

Defect Severity - MEDIUM

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- Minor function does not work or works incorrectly (wrong flow, ...)
- Any special cases included invalid data, boundary value,... for major function returns incorrectly
- Redundant outputs
- Performance effects

Defect Severity - COSMETIC

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A very minor thing is wrong such as

- Typos
- A spelling/ grammatical error on a user-interface screen/ message
- Align text, fields, forms, labels
- Incorrect Tab index, set default button, set default cursor, short key,...
- Coding standard: name of object, variables, comments,...

Defect Type

- Requirement misunderstanding
- Feature missing
- Business logic
- Coding logic
- User Interface
- Performance
- Review code
- Review document
- Design

Defect Type

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- Requirement misunderstanding: defects caused by misunderstanding between the whole team and customer
  - Ex1: Customer request: C = A + ABS(B) → But developer does C = A + B.
  - Ex2: Requirement: Year field accepts value from 1990 to 2020 → Dev: Year field accept any number value
- Feature missing: defects caused by lack of any feature or feature incomplete
  - Ex : Customer requests 3 functions: Add new, modify and delete user.

    →But developer does only 2 functions: Add new and delete user.

Defect Type

- Business logic:
  - Defects caused by misunderstanding between team members are classified.
  - Redundant functions cause business logic defects
  - Requirements not clarified in requirement docs, assumptions of project team do not meet customer expectation, should correct

  Ex: In a system:

  - Page 1: When user click ”Back” button, system displays previous page with status the same user has been done before.

  - Page 2: The ”Back” button system displays previous page but the previous status the same user has been done before was refreshed.

Defect Type

- Coding logic:
  - Carelessness
  - Technical skill
  - Data validation
  - Coding problems
  - Ex: For component ListView in VB, ListItem is indexed from 1...n (n = Number of ListItem in ListView).
    - If developer indexes in code: for i = 0 to n-1 → The index n is missed, should start with 1.
    - It’s Coding logic defect: "Index of out bound”

Defect Type

- User Interface:
  - Errors in Interface, Layout
  - Ex:
    - A spelling/ grammatical error on screen/ message
    - Align text, fields, forms, labels
    - Incorrect Tab index, set default button, set default cursor, short key
- Performance
  - Poor processing speed;
  - System crash because of life size
  - Load or memory problems
  - The problems happen frequently to many users

Defect Type

- Review code:
  - Specific code-related matters
  - Problems with coding standards: alignment, layout, comments, modification history
  - Not follow coding convention
  - Not follow detail design or requirement
- Review document
  - Document of project: Test document, plan, etc.
  - Defects found while reviewing documents: Project Plan, SRS, Test Plan,… related to document standard (template, version, header/footer,...)
  - Grammar errors
- Design
  - Specific design-related matters

Defect Priority

- Immediately
- High
- Medium
- Low

PART 2: DEFECT MANAGEMENT

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- Using template to log and track defect
- Log defect effectively

Defect Content

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- Main items in a defect:
  - Defect title
  - Component/Function
  - Defect description
  - Step to reproduce
  - Actual result
  - Expected result
  - Screen shot if any
  - Priority
  - Severity
  - Test case ID
  - Defect type

Defect Content

- Defect status:
  - Opened
  - Assigned
  - Fixed
  - Deferred
  - Re-opened
  - Closed
  - Reject(works as per Requirements, won’t fix, works for me)

Defect Content

- How to write a good defect report:

  General outline of a bug report:

  1. Summary/Title
  2. Component/Function Name
  3. OS (optional)
  4. Description
  5. Steps to Reproduce
  6. Actual Results
  7. Expected Results
  8. Attachments OS (optional)

- Defect summary: Problem + Action + Location
- Defect management tools: Bugzilla, Mercury,…

Common Test Measurements

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- Measurements:
  - Defects: number, severity, type of defects
  - Test effort: time spend for testing activities
  - Test coverage: number of executed test cases/ Total number of TCs
  - Test successful coverage: number of test cases executed pass/total number of test cases

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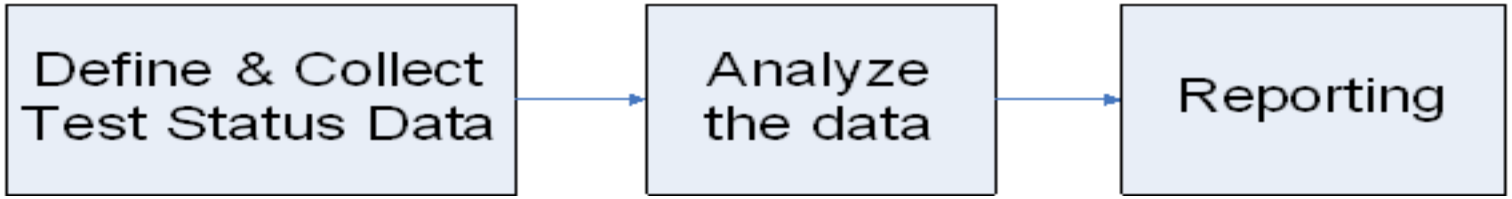
Example

Test Reporting Process



When Test Report should be created?

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- Pre-defined checkpoints (milestones)
- The end of testing stage
- Whenever significant problems are detected

Collect Test Status Data

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Categories of data:

- Test results data
- Test case results and test verification results
- Defects

Test Result Data

- Results pictures: Pass/fail result pictures
- Software components, applications for test
- Platform – the hardware and software environment in which the software system will operate.

Test case & Test verification results

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- Results describe any variance between the expected and actual outputs
- They are results of below test techniques used by the test team to perform testing
  - Test cases – The type of tests that will be conducted during the execution of tests, which will be based on software requirements
  - Inspections – A verification of process deliverables against deliverable specifications.
  - Review checklists – Verification that the process deliverables/phases are meeting the user's true needs.

Defects

The description of defects:

- Name of defect
- Status of the defect
- Severity of the defect
- Type of defect
- Module code which contains defect
- How the defect was discovered
- Data the defect uncovered
- Test case of defect

Defect Report

- Defect Status Report: see current status of all defect in period of time
- Defect Distribution: see defect distribute to QC Activities
- Defect Re-Open: see the number defects are re-opened
- Defect Summary: see number defect based on Product Type
- Defect Trend: see trend of defect

Defect Report - Sample

- General Status Report
- Defect Distribution
- Defect Re-Open
- Defect Summary
- Defect Trend

Analyze the data

- Testers should answer these questions
  - What information does the project/customer need?
  - Which metrics are used in Reporting?

Testers should answer these questions

- How can testers present that information in an easy-to-understand format?
- How can I present the information so that it is believable?
- What can I tell the project management/customer that would help in determining what action to take?

Categories of the Test Report (examples)

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- Function test report

Test function	No. of TC	Executed Date	Doer	Status	Comment
Function A	42	2007/09/07	PhuongLL	Pass	
Function B	30	2007/09/07	LinhNT	Fail	
Function C	17	2007/09/08	LinhNT	Pending	Waiting for customer's confirm

Categories of the Test Report (examples)

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- Test case report:

ID	Test Case Description	Test Case Procedure	Expected Output	Result	Executed date	Note
	Function A					
[Module1 -1]	Test viewing "Company" form.	1. Login the system with Manager role. 2. Click "Company" tab in the left menu.	The "Company" view form is displayed with the following information: - Company name - Company address - Phone - Fax	Pass	14-Sep-07	
[Module1 -2]	<Test case 2>			Fail	14-Sep-07	
[Module1 -3]	<Test case 3>			Pass	14-Sep-07	
	Function B					
[Module1 -4]	<Test case 4>			Pass	14-Sep-07	
[Module1 -5]	<Test case 5>			Pass	14-Sep-07	
	Function C					
[Module1 -6]	<Test case 6>			Fail	14-Sep-07	
			Test coverage	90	%	
			Test successful coverage	85	%	

Categories of the Test Report (examples)

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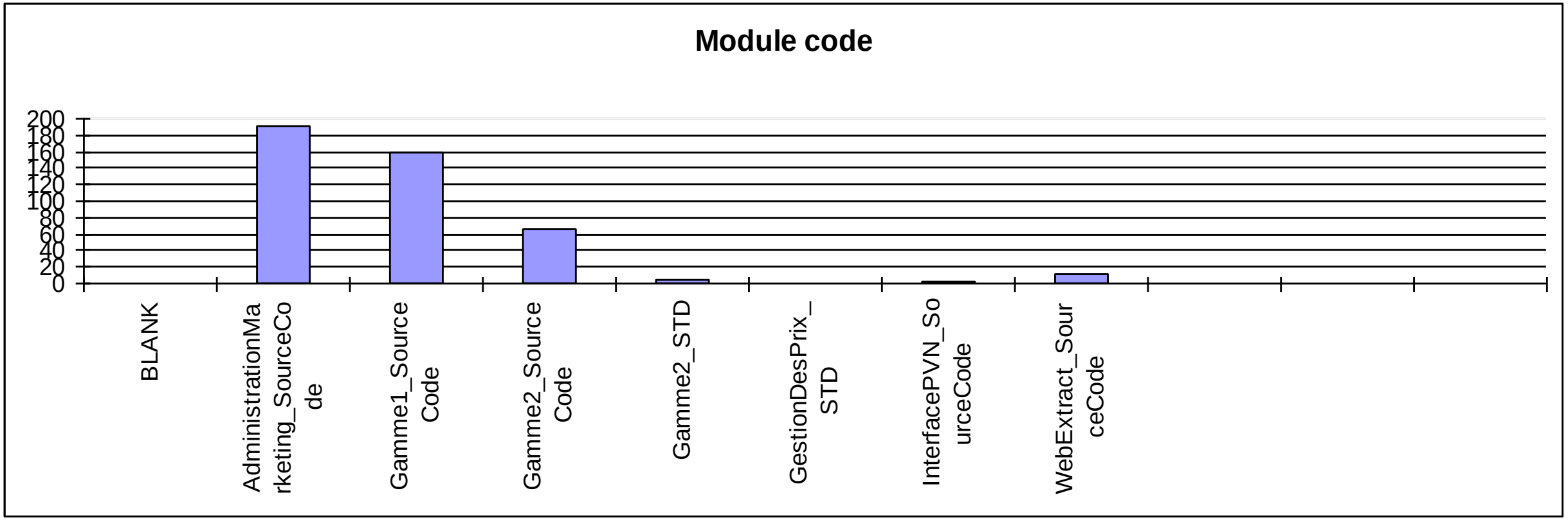
- Defect distribution report



Categories of the Test Report (examples)

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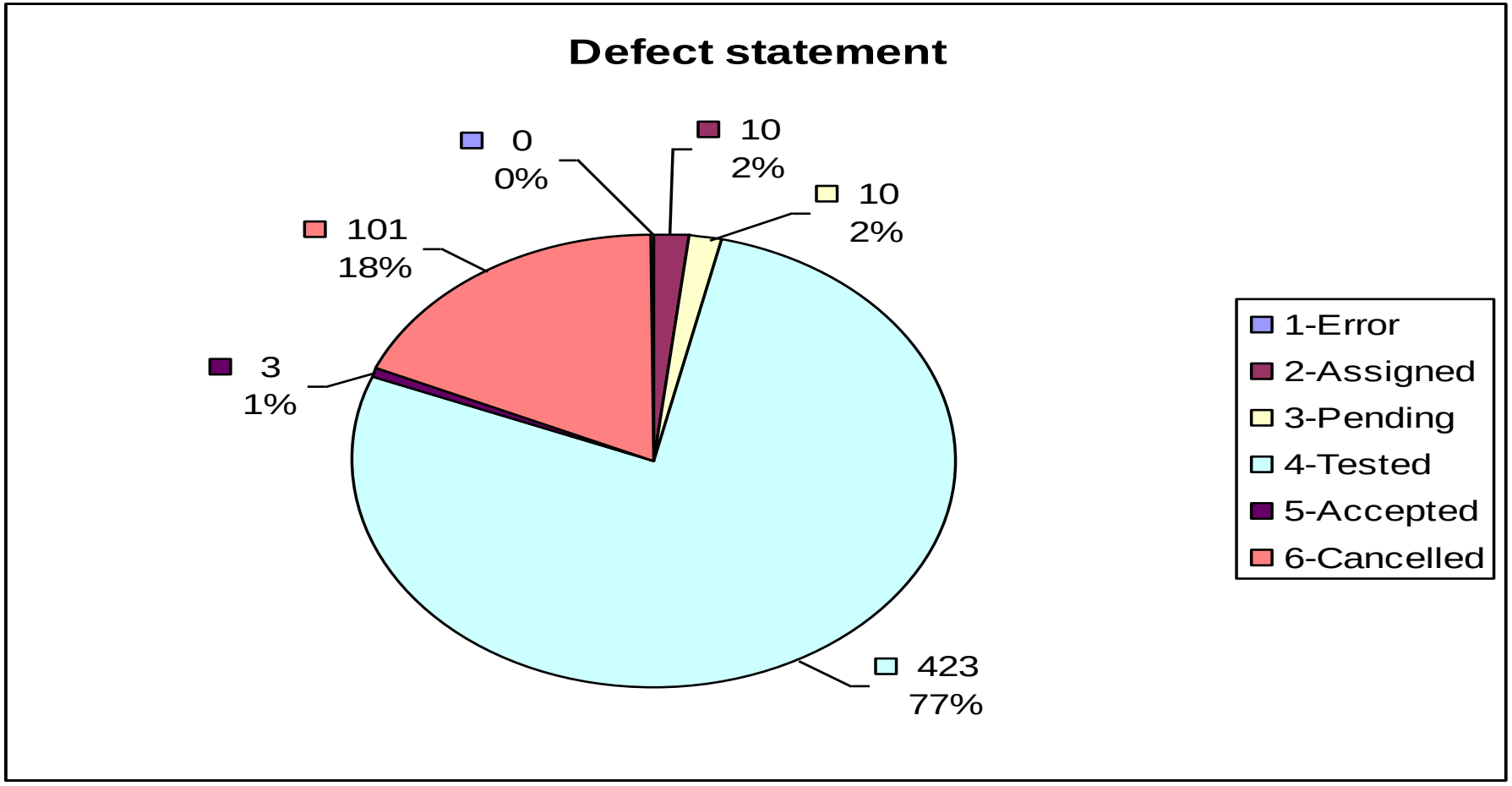
- Defect statement report



Practices to creating good Test Report

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- Don’t include names or assign blame
- Give a section to stress important items in the report
- Emphasize quality
- Eliminate small problem from test report (instead, give them directly to people in charge)

Exercise 1

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- Create test report for each function: include following items:
  1. Number of test case
  2. Number of passed test case
  3. Number of fail test case
  4. Number of untested test case
  5. Number of N/A test case
  6. Percentage of test coverage
  7. Percentage of test successful coverage

- Duration: 20’

Exercise 1

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TEST REPORT

Project Name	Manage Student	**Creator**	Nguyen A
Project Code	MS	**Reviewer/Approver**	Le B/ Tran C
Document Code	MS_Test Report_vx.x	**Issue Date**	5-Jan-10
Notes	Release 1 includes 4 modules: Login, Create user, Manager student profile, and Manage student mark		

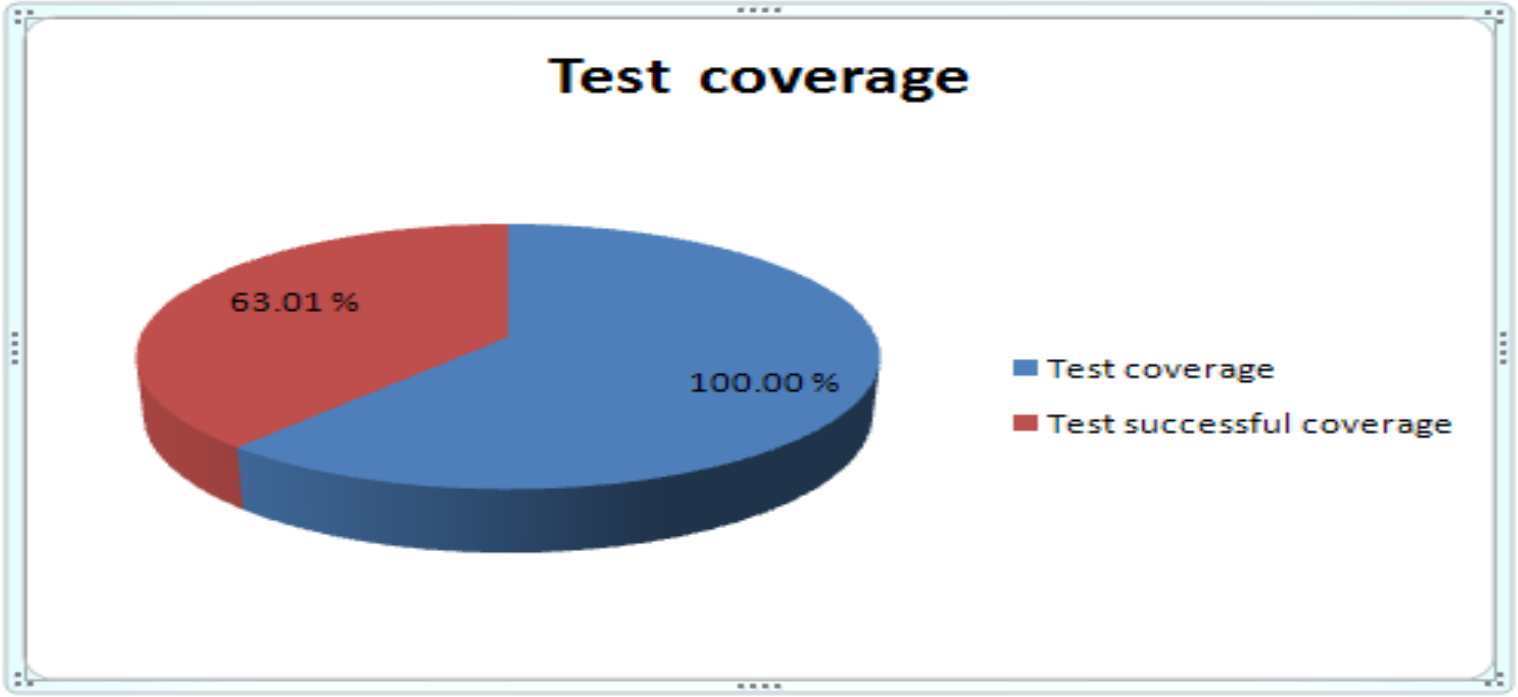
No	Module code	Pass	Fail	Untested	N/A	Number of test cases
1	Login	20	8	0	7	35
2	Create user	8	7	0	3	18
3	Manage student profile	90	0	0	9	99
4	Manage student mark	100	113	0	13	226
		218	128	0	32	378

Test coverage **100.00** %
Test successful coverage **63.01** %

Conclusion:

Function ‘Manage student mark’ has many fail test case.
The system can not calculate student mark

Exercise 1


Test coverage
63.01 %
100.00 %
Test coverage
Test successful coverage

Exercise 2

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- **Create general defect report:**
  - Open defects: base on severity (Fatal, serious, Medium, Cosmetic) and status of defect (Error, Assigned, Fixing, Corrected, Confirming)
  - Fixed defects: base on severity (Fatal, serious, Medium, Cosmetic) and status of defect Delivered, Validated, Approved, Accepted, Canceled, Closed)
  - Total weight defect:
    - 1 cosmetic defect = 1 w.def
    - 1 medium defect = 3 w.def
    - 1 serious defect = 5 w.def
    - 1 fatal defect = 10 w.def

- Duration: 20’

Exercise 2

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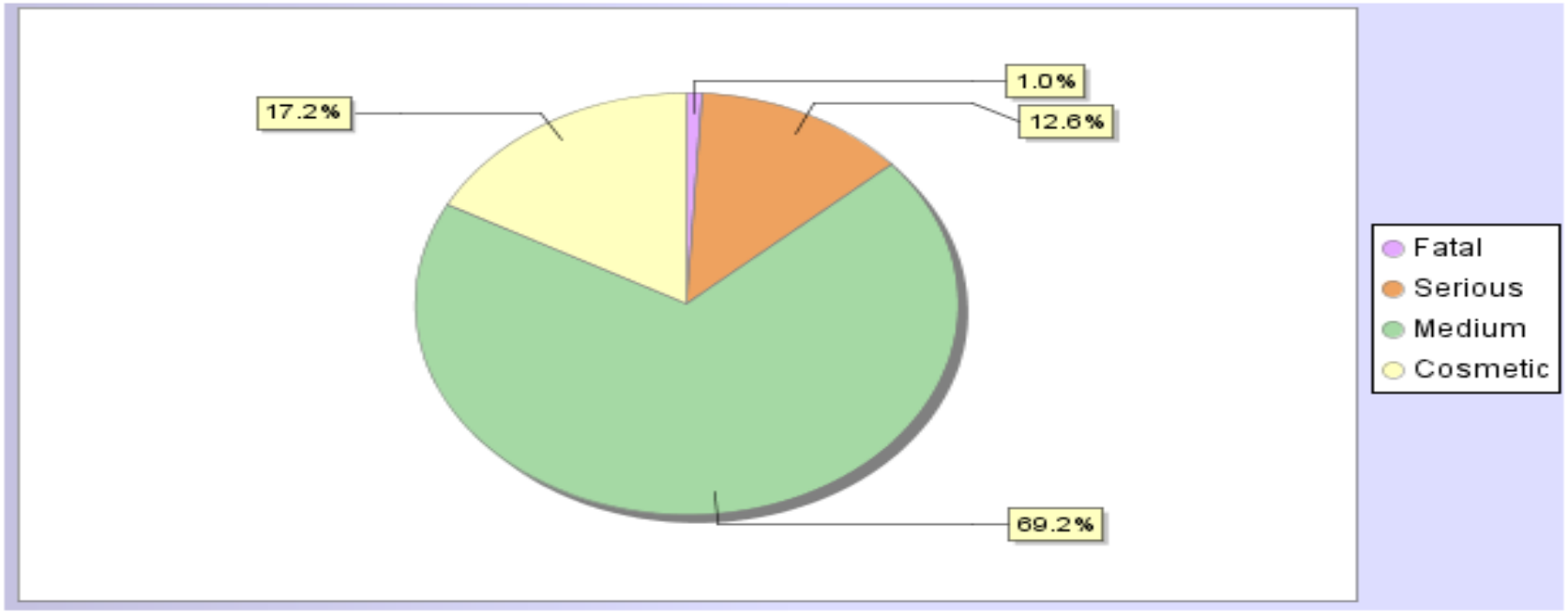
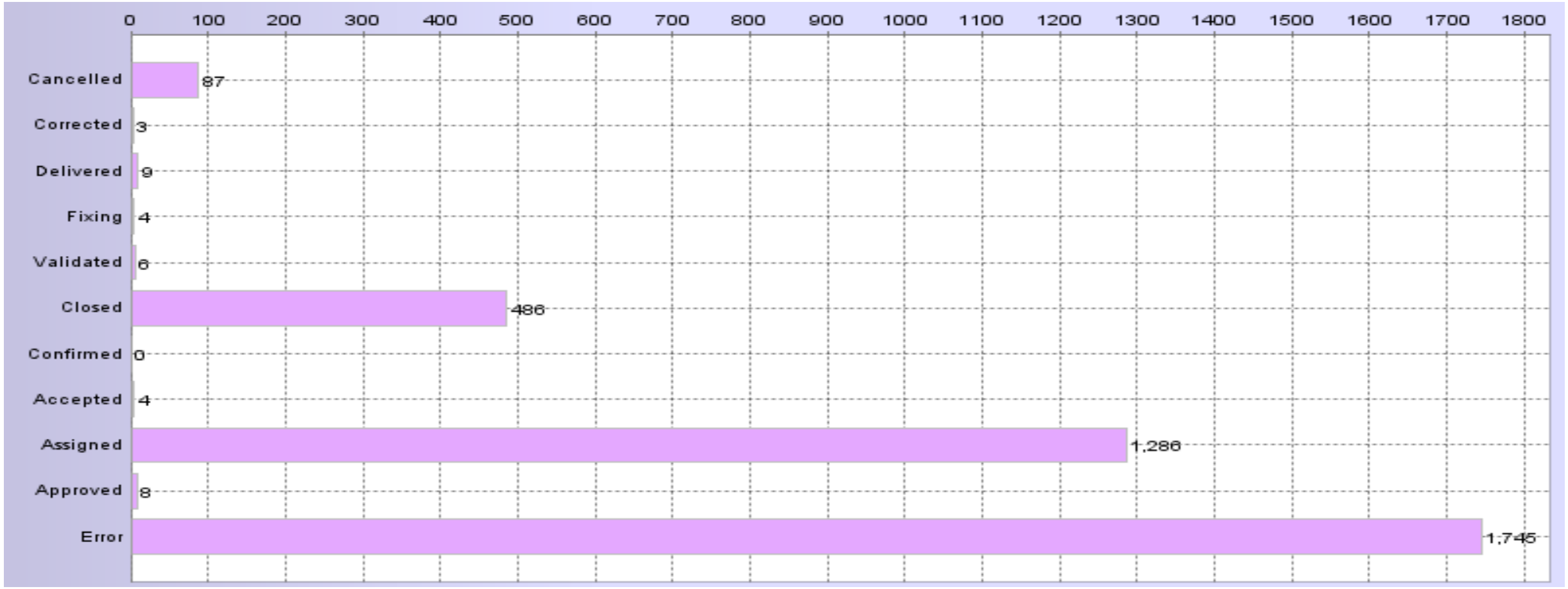
Severity	Open Defect						Fixed Defect							Total (Severity)
	Error	Assigned	Fixing	Corrected	Confirmed	No	Delivered	Validated	Approved	Accepted	Canceled	Closed	No	
Fatal	2	7				**9**					1	2	**3**	**12**
Serious	3	136				**139**			1		2	12	**15**	**154**
Medium	570	177	1	1		**749**	3	2	1	1	15	75	**97**	**846**
Cosmetic		5	1			**6**				1	22	181	**204**	**210**
Total (Status)	**575**	**325**	**2**	**1**		**903**	**3**	**2**	**2**	**2**	**40**	**270**	**319**	**1222**
Total (W.def)	**1745**	**1286**	**4**	**3**		**3038**	**9**	**6**	**8**	**4**	**87**	**486**	**600**	**3638**



Exercise 2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1100
1200
1300
1400
1500
1600
1700
1800
Cancelled
87
Corrected
3
Delivered
9
Fixing
4
Validated
6
Closed
486
Confirmed
0
Accepted
4
Assigned
1,286
Approved
8
Error
1,745

Exercise 3

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- **Create Defect distribution test report** (include following information)
  - Number of defects for each process (Requirement, Design, Coding, Test, Other)
  - Number of defects for each QC activities (Unit test, Integration test, System test, Acceptance test, Code review, Document review, Final Inspection, Baseline audit
  - Total weight defect:
    - 1 cosmetic defect = 1 w.def
    - 1 medium defect = 3 w.def
    - 1 serious defect = 5 w.def
    - 1 fatal defect = 10 w.def
- Duration: 20’

Exercise 3

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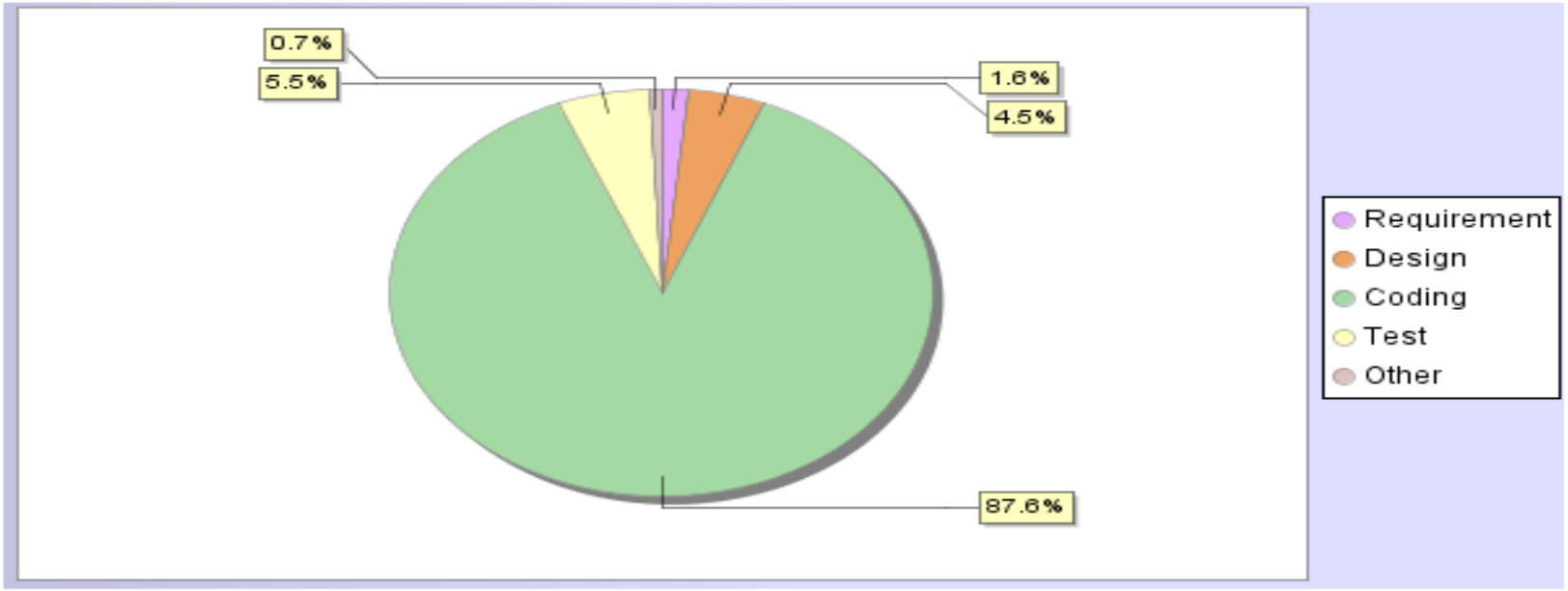
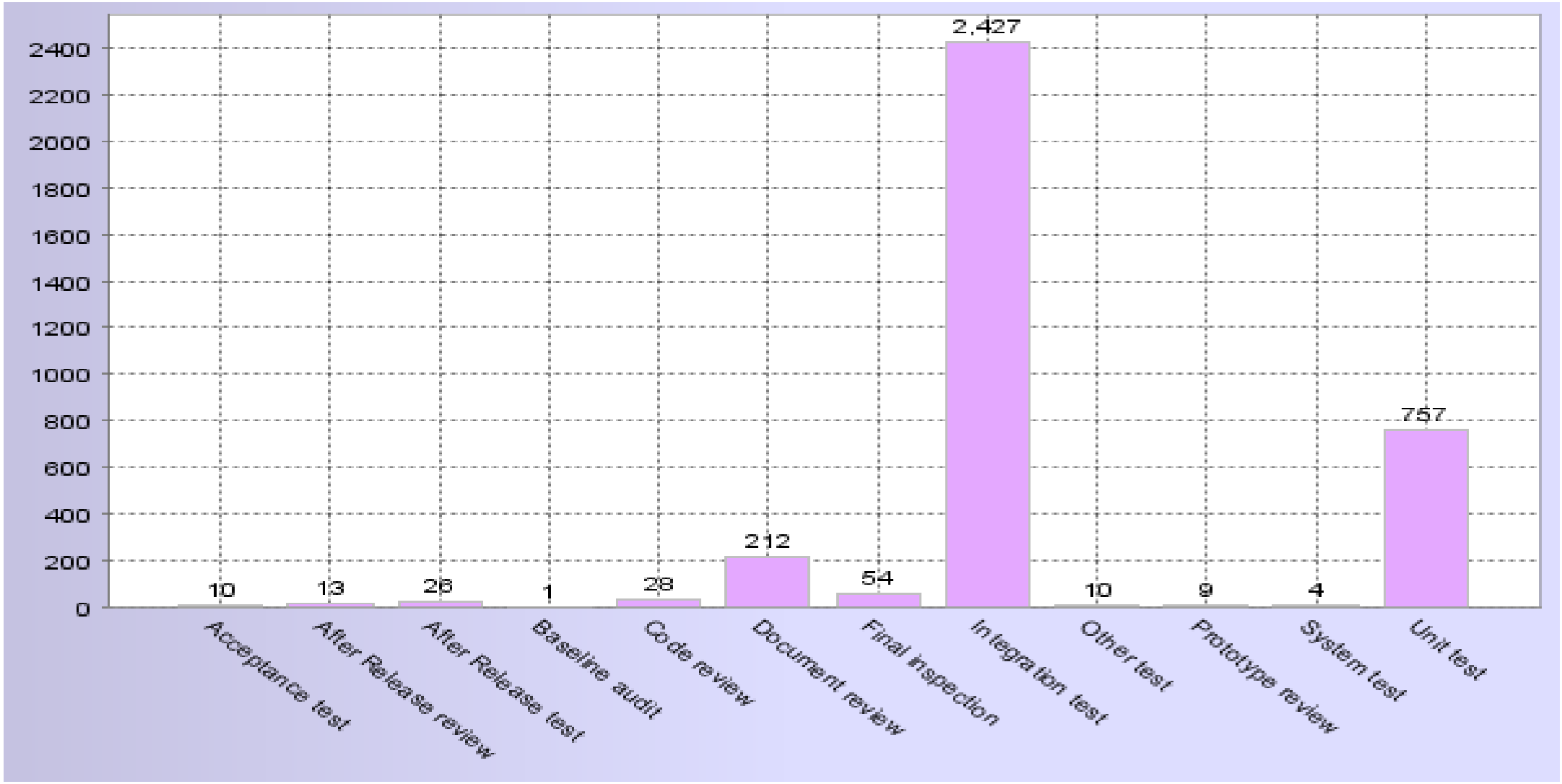
QC Activity	Requirement					Design					Coding					Test					Other					W.def
	F	S	M	C	W	F	S	M	C	W	F	S	M	C	W	F	S	M	C	W	F	S	M	C	W	
Acceptance test									3	**3**				1	**1**			1		**3**			1		**3**	**10**
After Release review								1	7	**10**				1	**1**				1	**1**				1	**1**	**13**
After Release test									4	**4**				2	**2**	2				**20**						**26**
Baseline audit																								1	**1**	**1**
Code review													3	19	**28**											**28**
Document review			5	36	**51**		8	26	20	**138**				1	**1**			5	7	**22**						**212**
Final inspection				6	**6**			1	1	**4**			8	11	**35**			2	2	**8**				1	**1**	**54**
Integration test											1	5	749	25	**2307**	4	8	11	1	**114**			2		**6**	**2427**
Other test																					1				**10**	**10**
Prototype review																		3		**9**						**9**
System test																		1	1	**4**						**4**
Unit test				1	**1**				1	**1**	3	130	8	33	**737**		1	3	1	**15**			1		**3**	**757**
Total			**5**	**43**	**58**		**8**	**28**	**36**	**160**	**4**	**135**	**768**	**93**	**3112**	**6**	**9**	**26**	**13**	**196**	**1**		**4**	**3**	**25**	**3551**



Exercise 3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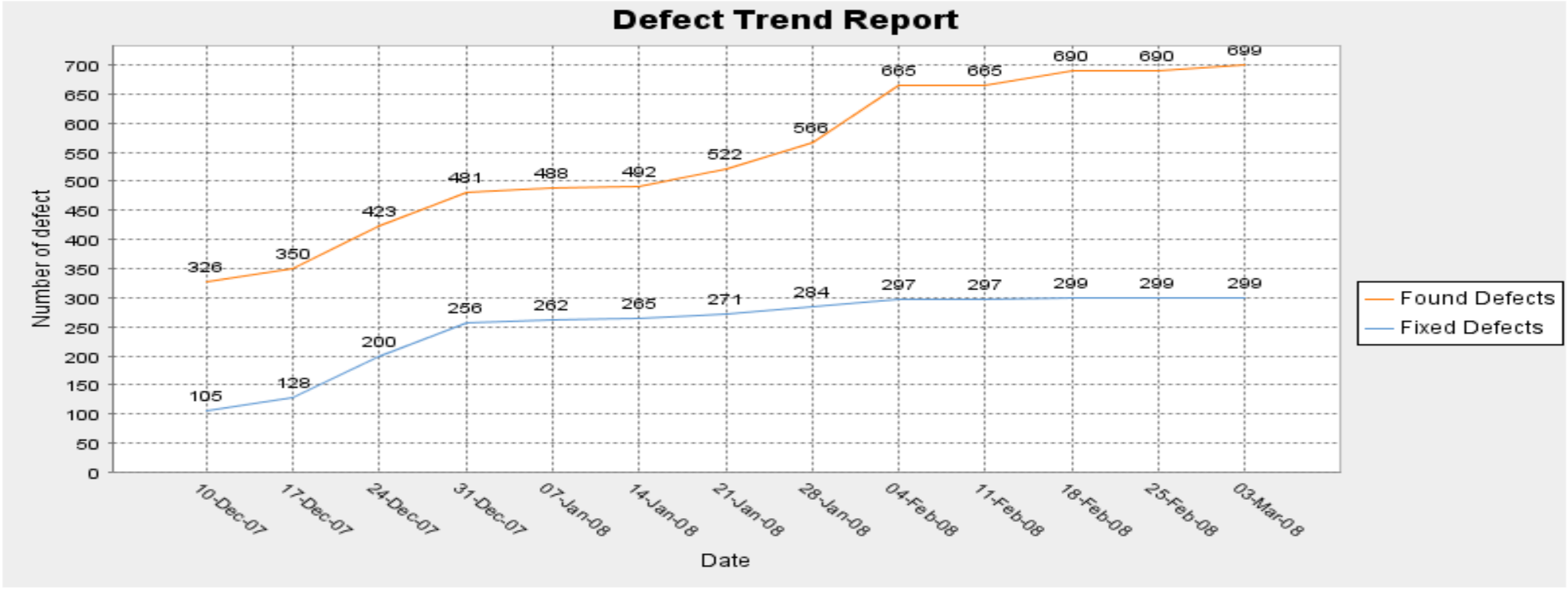
Acceptance test
After Release review
After Release test
Baseline audit
Code review
Document review
Final inspection
Integration test
Other test
Prototype review
System test
Unit test

Exercise 3

- **Create Defect trend**
  - Draw graph to know found defects and fixed defect trend From date….. To date

- Duration: 20’

Exercise 4


Defect Trend Report
Number of defect
Date
Found Defects
Fixed Defects
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
326
350
423
481
488
492
522
566
665
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690
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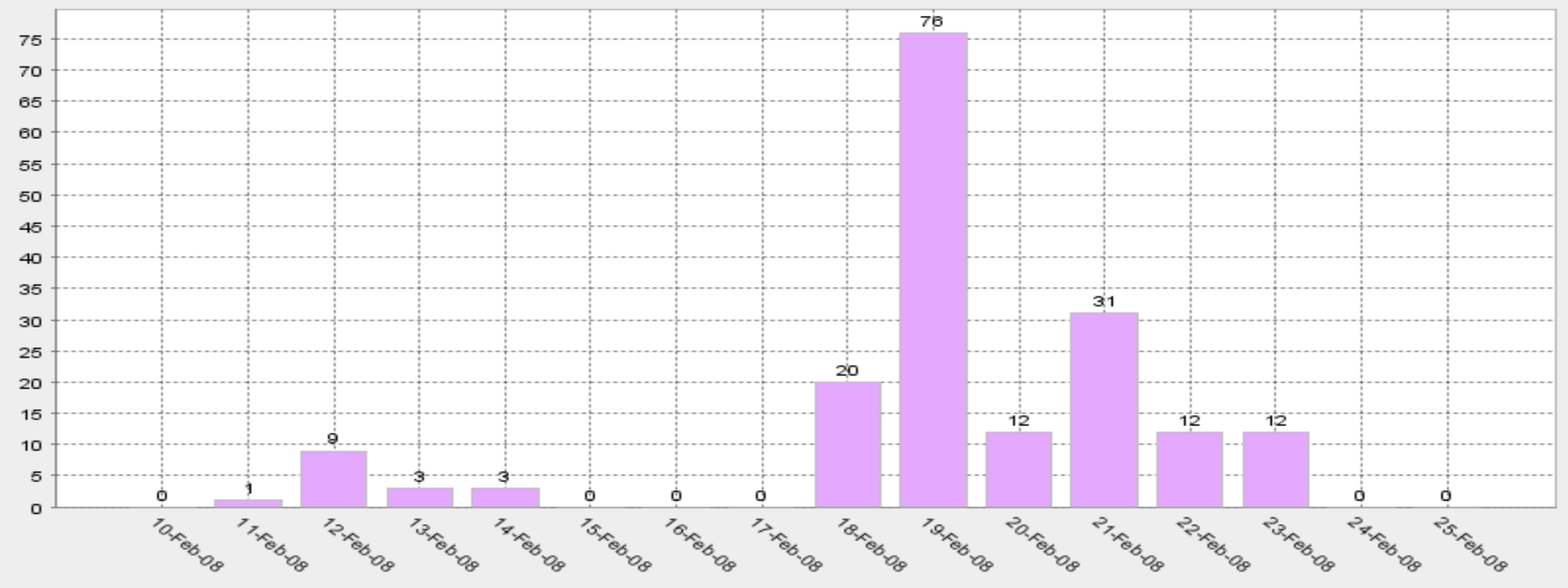
31-Dec-07
07-Jan-08
14-Jan-08
21-Jan-08
28-Jan-08
04-Feb-08
11-Feb-08
18-Feb-08
25-Feb-08
03-Mar-08

Exercise 4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24-Feb-08
25-Feb-08

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Thank you!