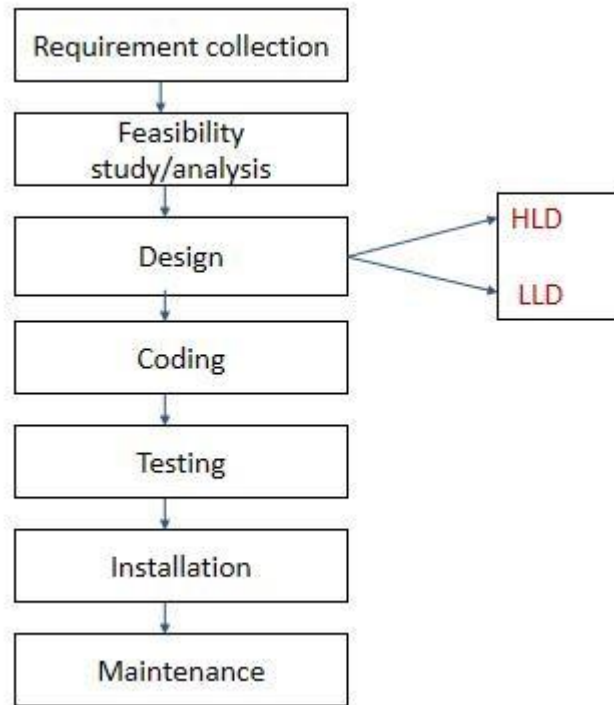# SDLC –Software Development Life Cycle

What is SDLC?

SDLC is a procedure followed to develop a software.

Stages of SDLC

Why we should go for SDLC?/ What happens if SDLC is not followed?

1. We will not know how much money is invested
2. We will not know what resources are required
3. We will not get any detailed document of requirement
4. There may be delay in releasing the software

When we should go for SDLC?

Whenever we want to develop a software as a company.
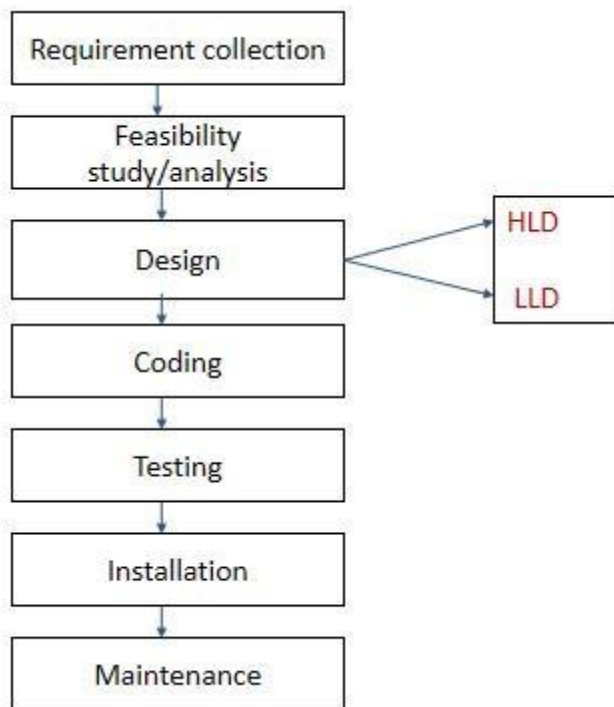
Different Models of SDLC

1. Waterfall Model
2. Spiral Model
3. V Model
4. Prototype Model
5. Agile Model

WATERFALL MODEL

What is waterfall model?

It is a traditional Model. The procedure followed to develop a software.

Stages of Waterfall Model

Requirement Collection

What is Requirement Collection?

Collecting the requirement from the customer place is called as requirement collection It is done by Business analyst or Product Analyst
BA goes to the customer place, collects the requirement in Business Language (CRS), coverts it to the software language (SRS), explains it to the developers, test engineer, project manager, architect and finance team

Who can become a Business Analyst?

Domain Expert -> Person who have worked on the same domain for more around 10-15 years

Senior Developer -> Developer who have worked on the same project domain for more than 6 to 7years

Senior Test Engineer -> A test Engineer who has tested in the same project same for more than 6 to7 years

CRS-> Customer Requirement Specification is the requirement document in the form of customer businesslanguage

SRS-> Software Requirement Specification is the requirement document in the form of the softwarelanguage

BA-> Converts CRS to SRS in Service based Company

PA -> Converts CRS to SRS in Product Based Company
Service Based Company-> They provide service and develop software for other companies, according to their requirementEx: Infosys, Wipro

Product Based Company-> They develop their own software and sell it to other companies for profitEx: Microsoft. Oracle

Feasibility Study

After requirement collection feasibility study is done by a team. The team consists of Business Analyst, Project Manager, Architect, Hr Team and finance Team

Business Analyst -> Collects the requirement and explains it to the team
Architect -> Checks if the technology available in the company supports the development. Alsosuggests what technologies should be used to build the software

HR team -> Checks if there the availability of sufficient number of developers for developing thesoftware.

Finance Team -> Checks the budget, cost needed and available to develop the software. Calculatesthe profit or loss for the company

Project Manager -> PM is the head of the team. Takes the suggestions of the complete team anddecides if the company to accept the development of the software or not.

Design:

Designing is done by the Architect, Senior Architect, Technical Architect. In Designing we have 2 sub stages

High Level Design: Designing the architecture of the software
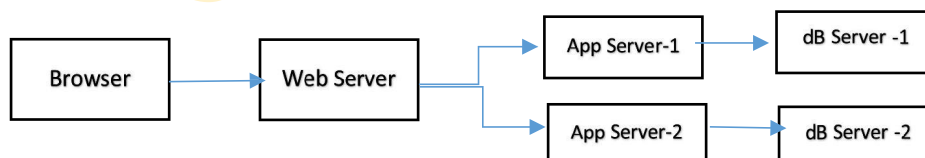
Low Level Design: Designing the smallest units of the software in detail

Example: In browser ->> welcome.java ->> login.java ->> homepage.java ………….

Coding

Coding is done by the developers looking in to the LLD and the requirement. It is done by developersin three ways

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1. Senior Developer: Critical features
2. Junior Developer: Major features
3. Freshers: Minor features

Testing

Testing is done by the test Engineers to check if the software is working as per the requirement andlog defects against it.

Note: In waterfall model, developers are involved in testing.

Why Developers should not be involved in testing?
1. Developers consume most of the time for developing the software rather than testing andtesting will have no time
2. Developers see the product from the positive point of view and not from negative point ofview
3. Developers will have over confidence on the software that they have built.
4. Developers might find the defects while testing but still end up not fixing it.

Installation:

In software companies, installation is done at the customer place. It is done by the Installation Engineers, IT Engineers, Field Engineers, Implementation Engineers, Release Engineers.

Maintenance

Software is installed in the customer place for usage in real time. If customer finds any defect, thesoftware company fixes it as per the agreement signed.

If the defect is found within the warranty period, then defect is fixed for free, else the customer willbe charged for fixing the defect.

Why do we call it as waterfall model?

Backtracking Is not possible-Means once the requirements are freezed, we cannot change therequirement.

1. Every software is developed to support the business, and every business changes with time.
2. Due to competition, updating and adopting to the latest technology is necessary

Advantages
1. Requirement, design, or code does not change, so we get a stable end product
2. Quality of the software will be good
3. It is an easy and simple model to adopt.

Disadvantages

1. Testing is a small phase – Only after coding and software is ready, testing is done. Requirement and design are not tested
2. Developers are involved in testing
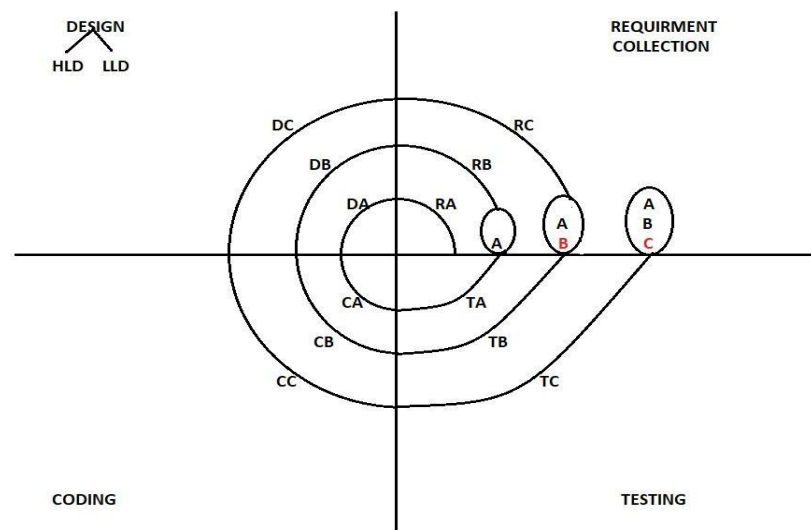3. Backtracking Is not possible

Application
1. Simple and short term projects

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2. When customer freezes the requirement
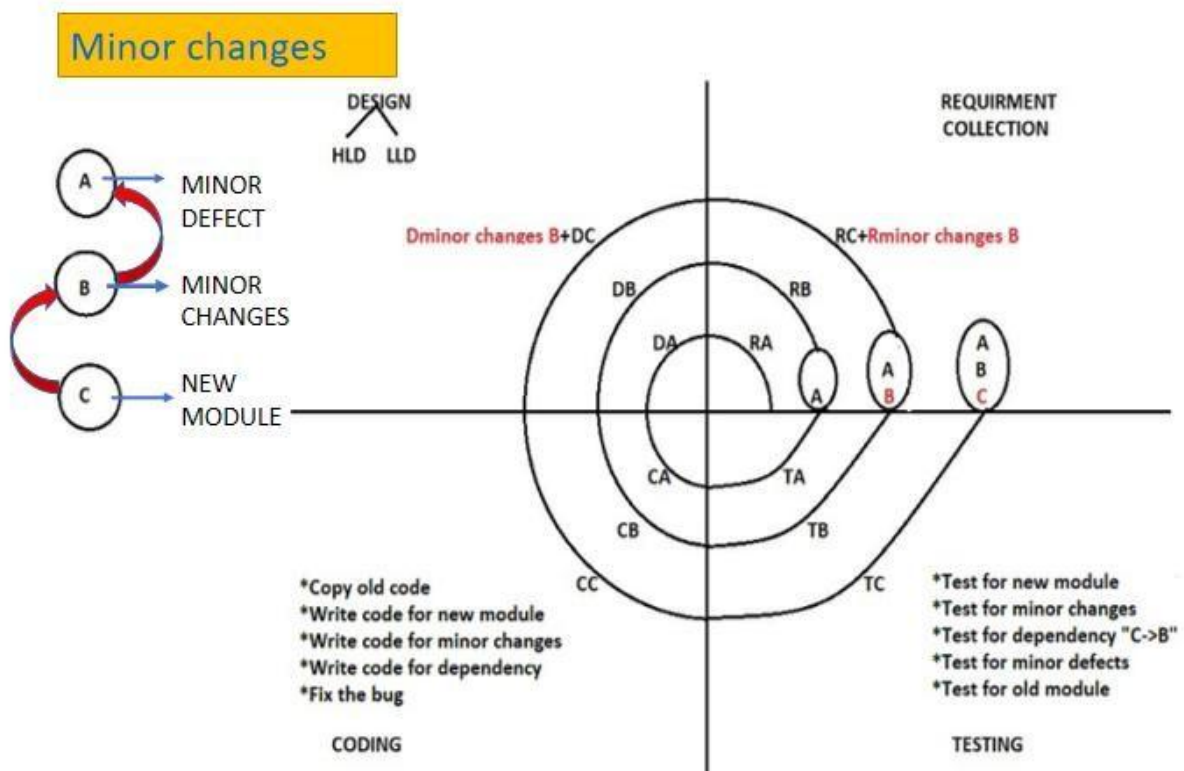   Ex: MRI machine, mouse, keyboard, x-ray machine..

SPIRAL MODEL

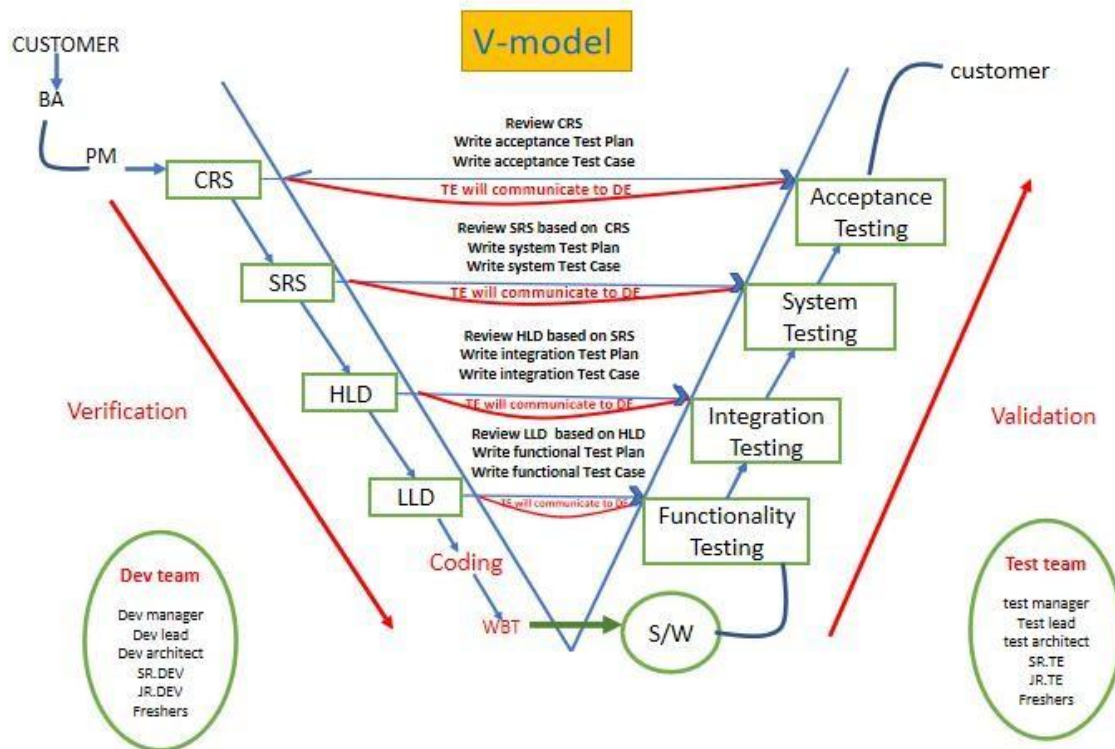Here we will develop the software module-wise

Here once requirement collection for 'A' is done , we go for design of module 'A'

Once design is done & after coding we go for testing of 'A' same process continue module wise forthe upcoming requirements.

Major changes

A

B → MAJOR CHANGES

C → NEW MODULE

DESIGN
HLD   LLD

REQUIRMENT COLLECTION

Dmajor changes in B

Rmajor changes in B

DB   RB
DA   RA
A   A   A
       B   B

CA   TA
CB   TB
CC   TC

*Copy old module
*Write code for major changes
*Write code for dependency

*Test the major changes
*Test the remaining portion
*Test the old modules

CODING

TESTING

Advantages

1. Requirement changes are allowed after every cycle with minimum efforts

2. Addition of new requirement is allowed

Dis-Advantages

1. Same process repeats for each and every module.

2. It is a traditional model ,Here developers were involved in testing

Application
We go for spiral model whenever customer gives the requirement in stages

V MODEL

It is a step by step procedure to develop new software. It is also called V and V model which meansVerification and Validation model

Verification:

It is the process of reviewing CRS, SRS, Design and Code, Testcase and related documents

Validation:

It is the actual testing done after the software is developed. Here we execute the test cases
Here both the testing and development teams are parallely involved.
Both testing team and development team first do the verification process and then validation process. Verification is done to prevent the defect.

Once the software is ready, validation is done in order to identify and fix the defects

Advantages

1. All the stages(CRS, SRS, LLD…) are tested

2. Downward flow of defects are reduced
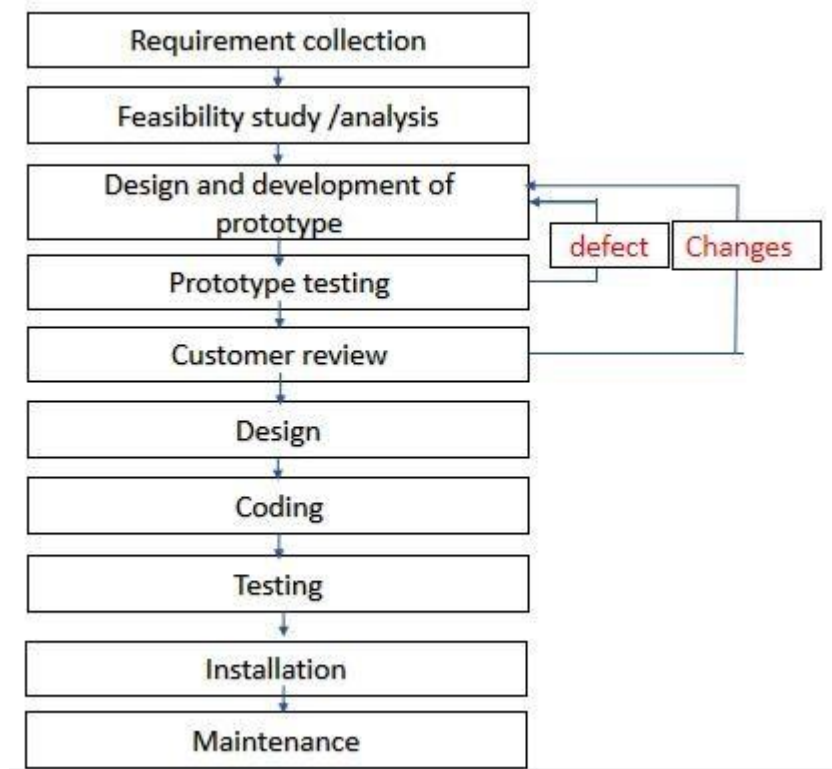
3. Software quality will be good

Disadvantages

1. Initial investment is more

2. Documentation is more

1. Complex projects and huge projects

2. For long term projects

PROTOTYPE MODEL

Here we develop a prototype or a dummy model before actual development of the software

Here , the customer looks at the prototype and give the feedback if any changes are needed a

After the prototype is confirmed by the customer the actual design , development and testing of thesoftware happens .

Advantages

Good communication between the customer & development team Customer can make the changes if needed after looking at the prototype

Disadvantages

1 Investment is more
2 Delay in starting the actual development

Applications:

1. When customer is new to the software When developers are new to the domain
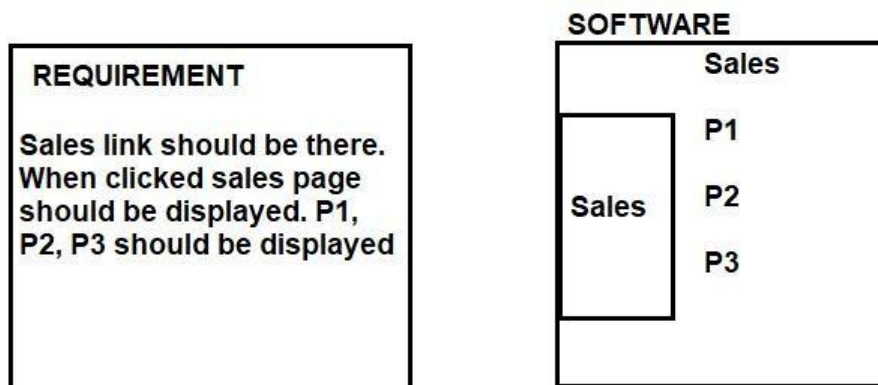2. When Customer is not clear about his own requirement.

SOFTWARE TESTING

What is software testing?

The Process of finding defect in the software is known as software testing.

Or

Verifying the functionality(behaviour) of an application against requirement specification is calledsoftware testing.

Or

Execution of program with the intend of finding the defects is called software testing.

Why do we do software testing?

1. Every Software is developed to support the business, if there is a defect in the software itaffects the business, so before we use the s/w for business it should be tested, all the problems must be recognised and solved.

2. To check if the s/w is developed according to requirement specification.

3. To improve the quality of the product.

Types of Software testing

Types of Software Testing

White Box Testing   Grey   Box   Black box Testing
Testing
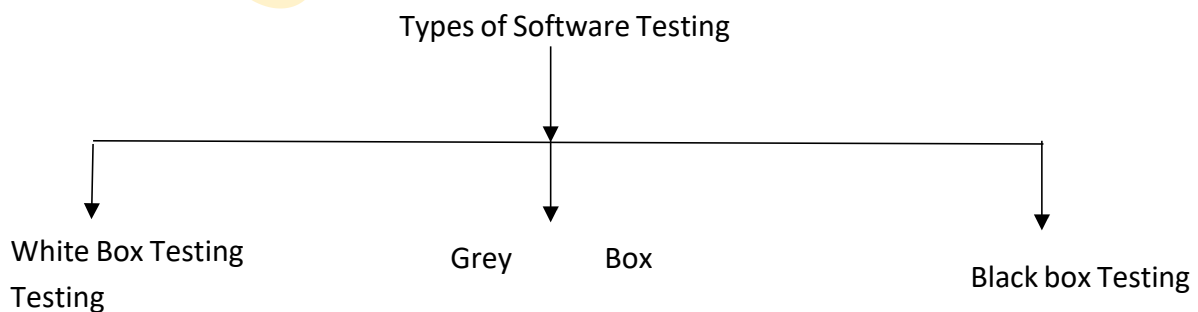
WHITE BOX TESTING

Testing each and every line of code is called as white box testing. WBT is done by the developers. It is called as white box testing because we can see the source code.Hence it is also called as glass box testing or transparent testing. It is also called as unit testing because the smallest unit of a softwareis every line code. It is also called as structural testing because the structure of anysoftware is its own source code
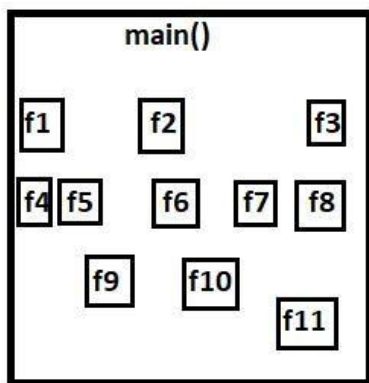
Types of white box testing

1) Path testing
2) Condition testing
3) Loop testing
4) Testing from memory point view
5) Testing from performance point of view

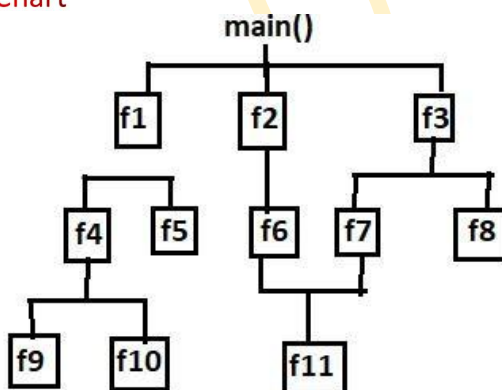## Path testing

Developers write the flow chart and test each and every individual path.

Code

Flow Chart

Advantages of writing flow chart

We will not miss any path We will not repeat any path

Condition testing

Testing all the logical condition for both true and false values
Example:
{
-
-
-
If (condition)
{
--
}
Else
{
--
}

Chances are there developer may test if portion and forget to test else portion or else, he may test else portion and forget to test if portion

Loop testing

Testing the loop for the designed number of cycles and checking if theterminating condition is working or not
Example:
--
While(10)
{
--
Break (5);
}

White box testing from memory point of view
What are the typical mistakes done by the developer because of which the code size increases?

1) Because of the logical mistakes
2) Because of repetition of same code instead of writing the functionsagain and again
3) Because of not using the inbuilt functions
4) Because of unused variables and functions

White box testing from performance point of view
What are the typical mistakes done by the developer because of which the program takes more time to run?

1) Because of not using better logic
2) Because of not using AND and OR operators correctly

BLACK BOX TESTING

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Verifying the functionality of an application against requirement specification is called as Black BoxTesting.

Types of black box testing

Functionality testing
Integration testing
System testing
Acceptance testing
Smoke testing
Adhoc testing
Performance testing
Compatibility testing
Usability testing
Accessibility testing
Reliability testing
Recovery testing
Exploratory testing
Globalization testing
Comparison testing
Yellow box testing
Regression testing

Why test engineers should not be involved in fixing the bugs/defects?

1. If you spend time in fixing 1 bug, we will not get time to catch some more bugs.

2. Chances are there fixing 1 bug might introduce lot of other bugs.