softserve quality management office

INTRO TO SELENIUM

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AGENDA

- Installation
- Architecture
- Drivers
- API for interaction with a browser
- Capabilities/options
- Tabs

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LET’S GO

INSTALLATION

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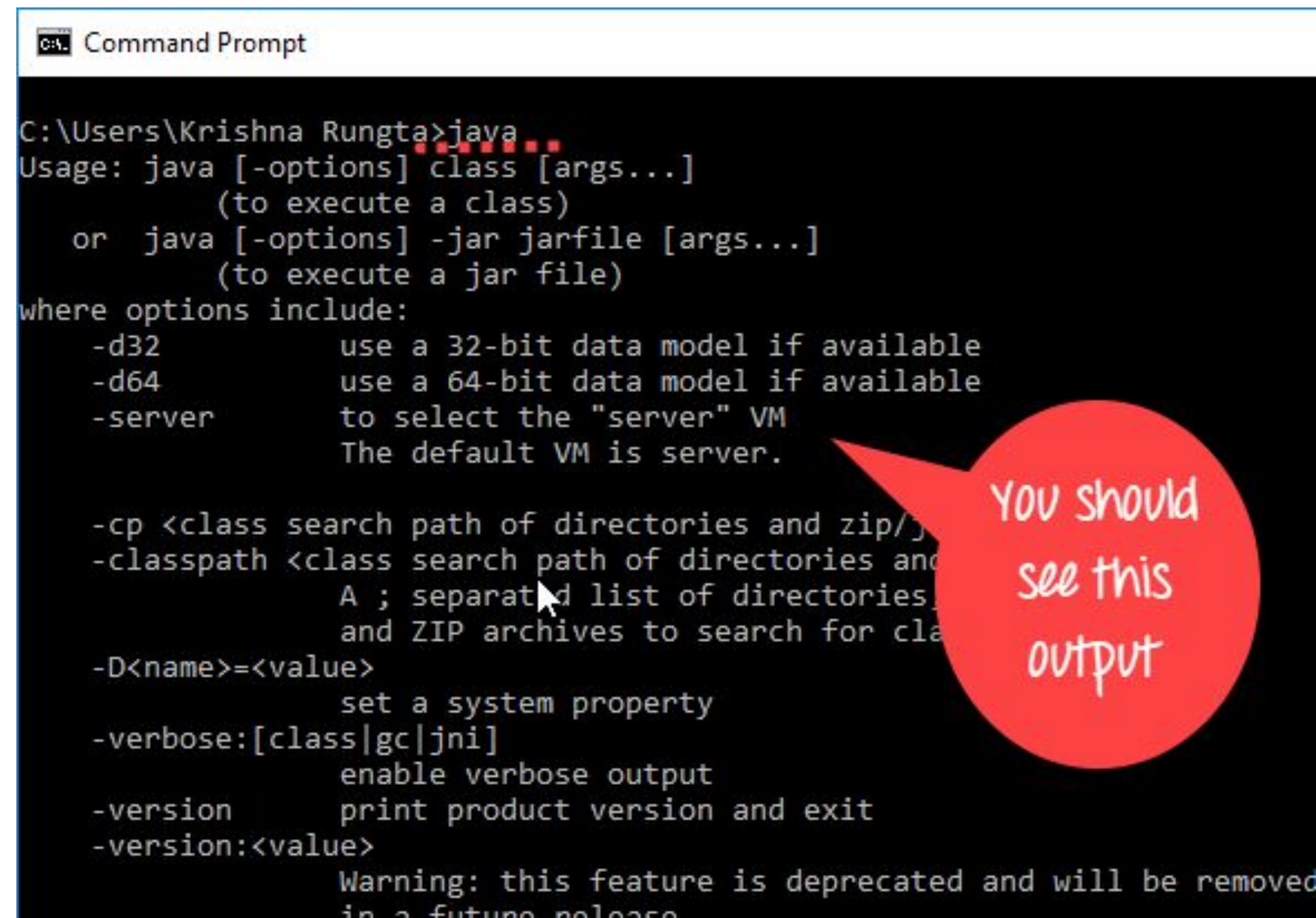
STEP 1 - JAVA

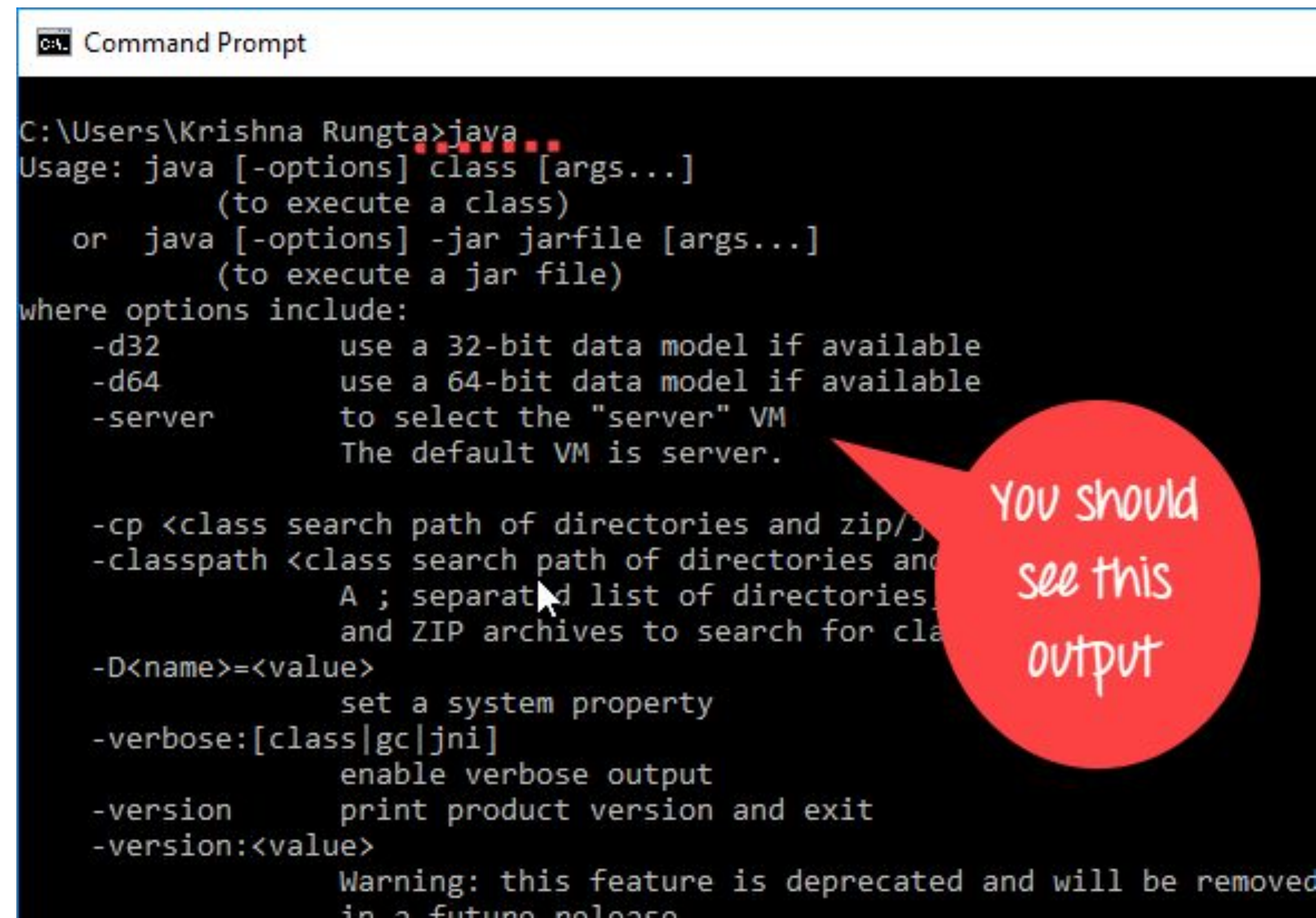
Download and install the **Java Software Development Kit (JDK)** here.

This JDK version comes bundled with Java Runtime Environment (JRE), so you do not need to download and install the JRE separately.
Once installation is complete, open command prompt and type "java". If you see the following screen you are good to move to the next step



STEP 2 - IDEA

Download and install the **Java Software Development Kit (JDK)** here.



TEST TYPE DEFINITION

Test Type it’s a group of test activities aimed at testing a component or system focused on a specific test objective.

Test activities can be grouped by:

- Test Approaches
- Test Levels
- Test Objectives

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PROACTIVE AND REACTIVE

REACTIVE

Reactive behavior is reacting to problems when they occur instead of doing something to prevent them

Testing is not started until design and coding are completed

PROACTIVE

Proactive behavior involves acting in advance of a future situation, rather than just reacting.

Test design process is initiated as early as possible in order to find and fix the defects before the build is created

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VERIFICATION VS VALIDATION

Are we building
the product **right**?

To ensure that work products meet their specified requirements.

Are we building
the **right** product?

To ensure that the product actually meets the user's needs, and that the specifications were correct in the first place.

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POSITIVE AND NEGATIVE

In **positive** testing
our intention is

to prove that an application will work on giving valid input data. i.e. testing a system by giving its corresponding valid inputs.

In **negative** testing
our intention is

to prove that an application will not work on giving invalid inputs.

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WHAT ABOUT BOXES?

Black-box Testing is a software testing method in which the internal structure/ design/ implementation of the item being tested is NOT known to the tester.

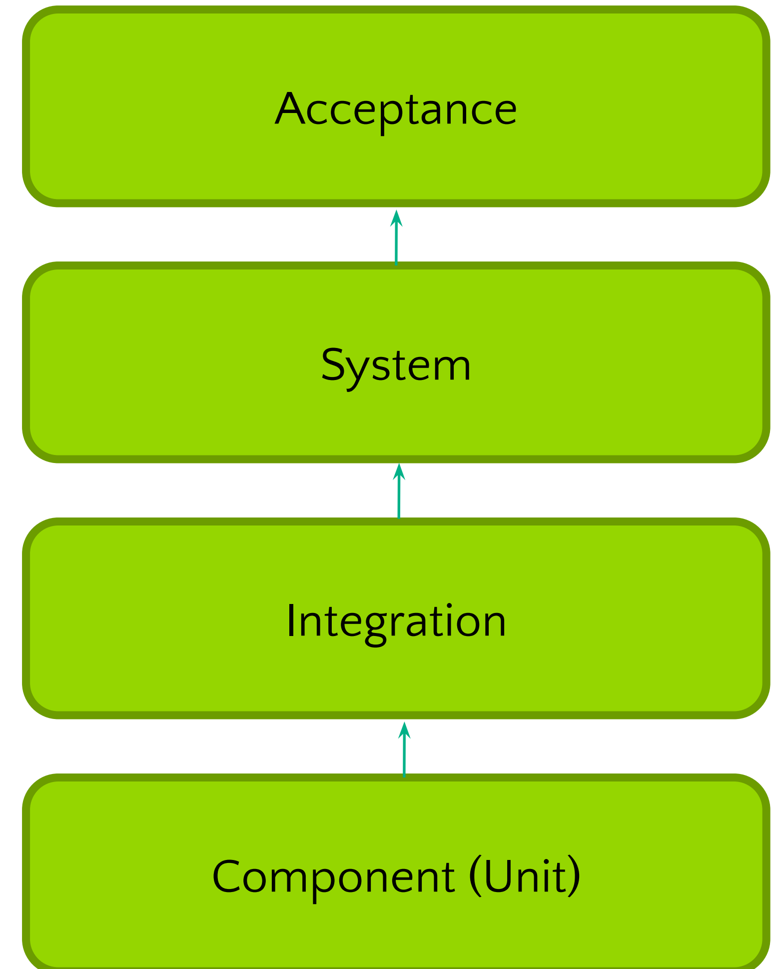
White-box Testing is a software testing method in which the internal structure/ design/ implementation of the item being tested is known to the tester.

Grey-box Testing is a software testing method which is a combination of Black-box and White-box Testing methods.

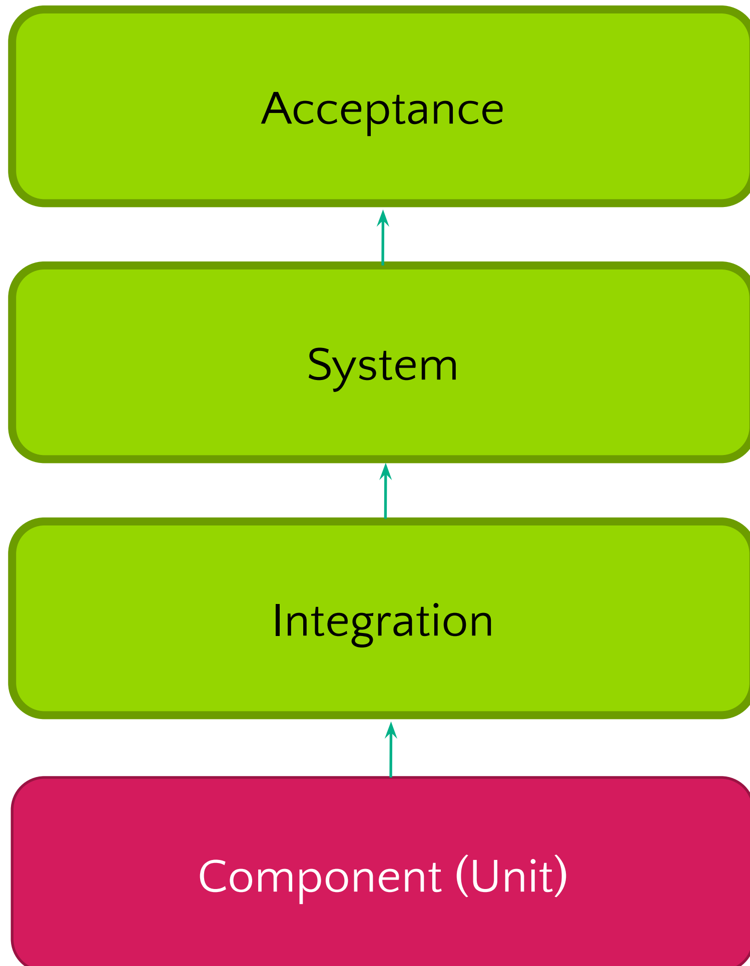
TEST LEVELS

Test levels are characterized by the following attributes:

- Specific objectives
- Test basis, referenced to derive test cases
- Test object (i.e., what is being tested)
- Typical defects and failures
- Specific approaches and responsibilities



COMPONENT LEVEL



Testing on the Component Test Level is called **Component** (**Unit**, **Module**) testing

Component (Unit) Test Level	
Who	DEV
When	Component is developed
Why	To validate that each unit of the software performs as designed
How	White-box testing

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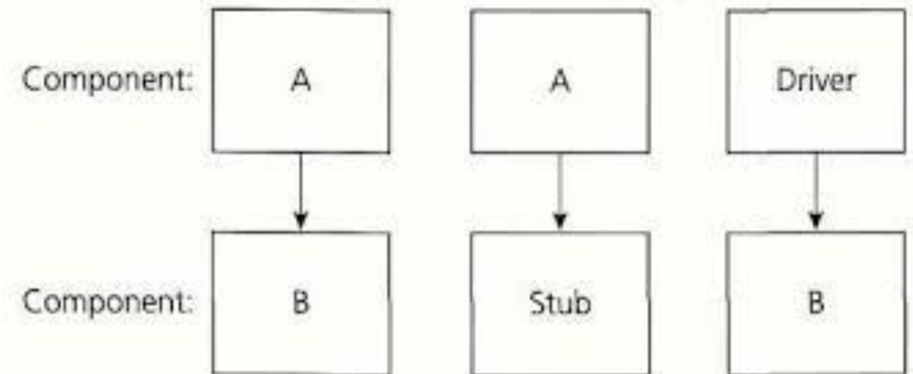
UNIT TESTING

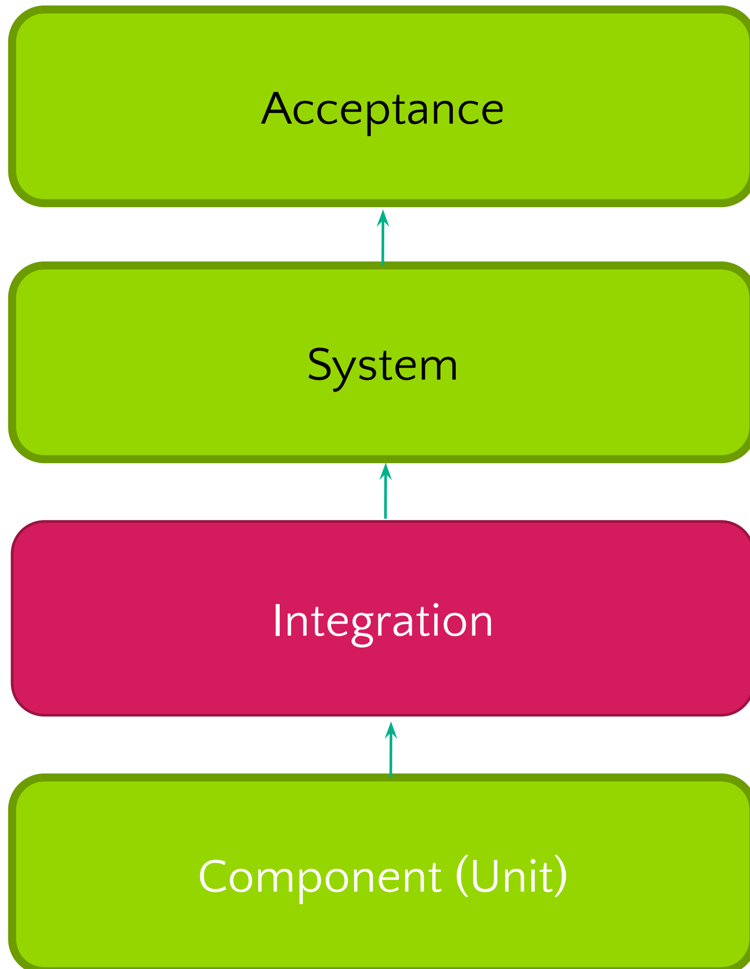
Examples of a **test basis**:
- Detailed design
- Code
- Data model
- Component specifications

Typical **test objects** for component testing include:
- Components, units or modules
- Code and data structures
- Classes
- Database modules

Typical defects and failures:
- Incorrect functionality (e.g., not as described in design specifications)
- Data flow problems
- Incorrect code and logic



INTEGRATION LEVEL



Testing on the Integration Test Level
is called **Integration** testing

Integration Test Level	
Who	DEV, QC
When	Units to be integrated are developed
Why	To expose faults in the interaction between integrated units
How	White-box/ Black-box/ Grey-box Depends on definite units

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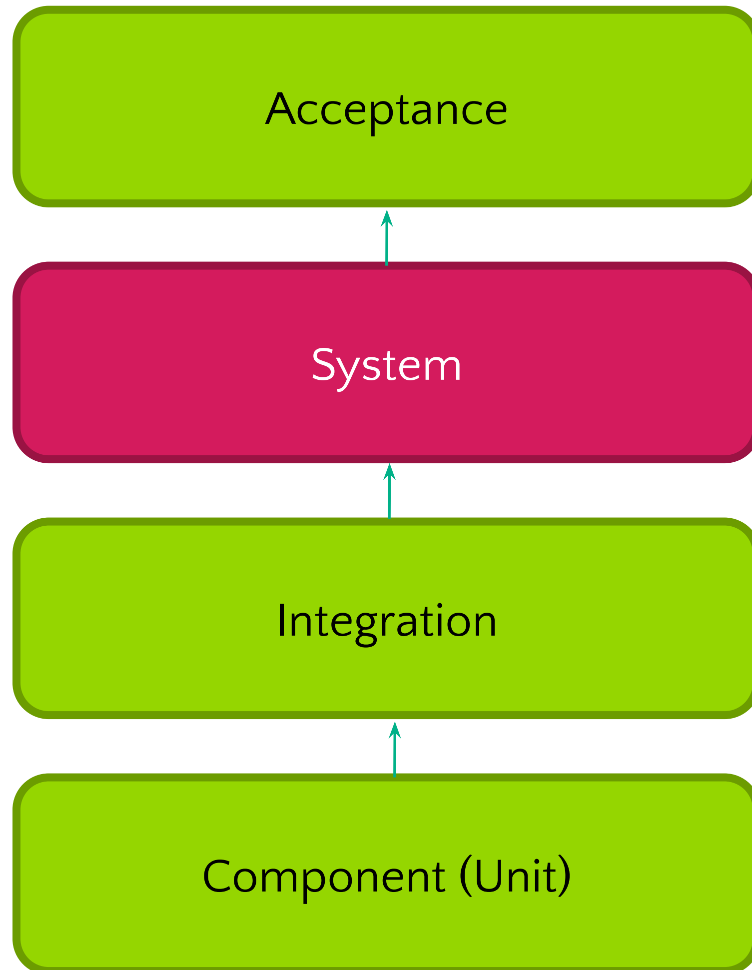
SYSTEM LEVEL



Testing on the System Test Level
is called **System** testing

System Test Level	
Who	QC
When	Separate units are integrated into System
Why	To evaluate the system's compliance with the specified requirements
How	Black-box testing

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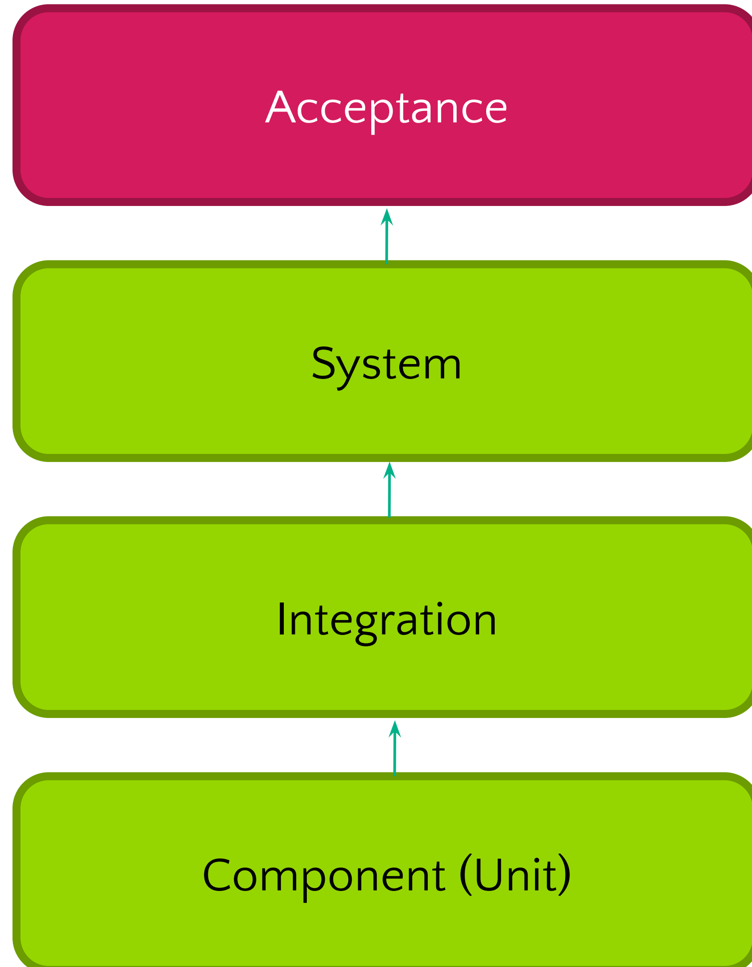
ACCEPTANCE LEVEL



Testing on the Acceptance Test Level is called **Acceptance** testing

Acceptance Test Level	
Who	People who have not been involved into development
When	Component is developed
Why	To evaluate the system's compliance with the business requirements and assess whether it is acceptable for delivery
How	Black-box testing

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TEST TYPES

Testing of function
(Functional testing)

Testing of software product characteristics
(Non-functional testing)

Testing of software structure/architecture
(Structural testing)

Testing related to changes
(Confirmation and Regression testing)

Testing based on an analysis of the specification of the functionality of a component or system.

According to ISO 25010 **Functional suitability** consists of:

- Functional completeness
- Functional correctness
- Functional appropriateness

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According to ISO 25010 **Functional suitability** consists of:

- Functional completeness
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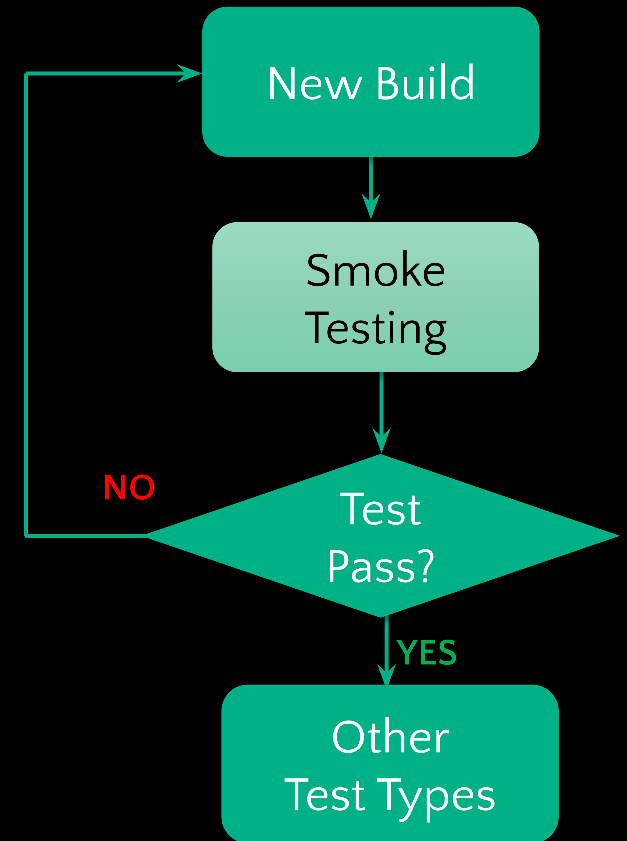
SMOKE TESTING

A subset of all defined/planned test cases that cover the main functionality of a component or system, to ascertaining that the most crucial functions of a program work, but not bothering with finer details.

Purposes:

- ✔ is done before accepting a build for further testing;
- ✔ is intended to reveal simple but critical failures to reject a software build\release;
- ✔ determines whether the application is so badly broken that further testing is unnecessary.



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TEST TYPES: NON-FUNCTIONAL

Testing of function
(Functional testing)

Testing of software product characteristics
(Non-functional testing)

Testing of software structure/architecture
(Structural testing)

Testing related to changes
(Confirmation and Regression testing)

Testing the attributes of a component or system that do not relate to functionality.

According to ISO 25010 **Non-functional characteristics** are:

- Performance efficiency
- Compatibility
- Usability
- Reliability
- Security
- Maintainability
- Portability

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TEST TYPES: NON-FUNCTIONAL

- **Performance efficiency**: Time behavior, Resource utilization, Capacity.
- **Compatibility**: Co-existence, Interoperability.
- **Usability**: Appropriateness recognizability, Learnability, Operability, User error protection, User interface aesthetics, Accessibility.
- **Reliability**: maturity (robustness), fault-tolerance, recoverability and availability.
- **Security**: Confidentiality, Integrity, Non-repudiation, Accountability, Authenticity.
- **Maintainability**: Modularity, Reusability, Analysability, Modifiability and Testability.
- **Portability**: Adaptability, Installability and Replaceability.

TEST TYPES: STRUCTURAL

Testing of function
(Functional testing)

Testing of software product characteristics
(Non-functional testing)

Testing of software structure/architecture
(Structural testing)

Testing related to changes
(Confirmation and Regression testing)

Mostly applied at Component and Integration Test Levels

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TEST TYPES: REGRESSION

Testing of function
(Functional testing)

Testing of software product characteristics
(Non-functional testing)

Testing of software structure/architecture
(Structural testing)

Testing related to changes
(Confirmation and Regression testing)

If we have made a change to the software, we will have changed the way it functions, the way it performs (or both) and its structure.

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SUMMARY

Test activities can be grouped using different classification:

- By the degree of automation (Manual and Automated);
- By the level of awareness about the system and its internal structure (Black-, White-, Grey-box);
- By the basis of positive scenario (Positive and Negative);
- By the degree of preparedness to be tested (Scripted and Unscripted);
- By the degree of component isolation (by Test levels);
- By the Test Objectives.

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TEST DESIGN

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Categories

Static: Static testing test software without executing it

Dynamic: Testing that involves the execution of the software of a component or system

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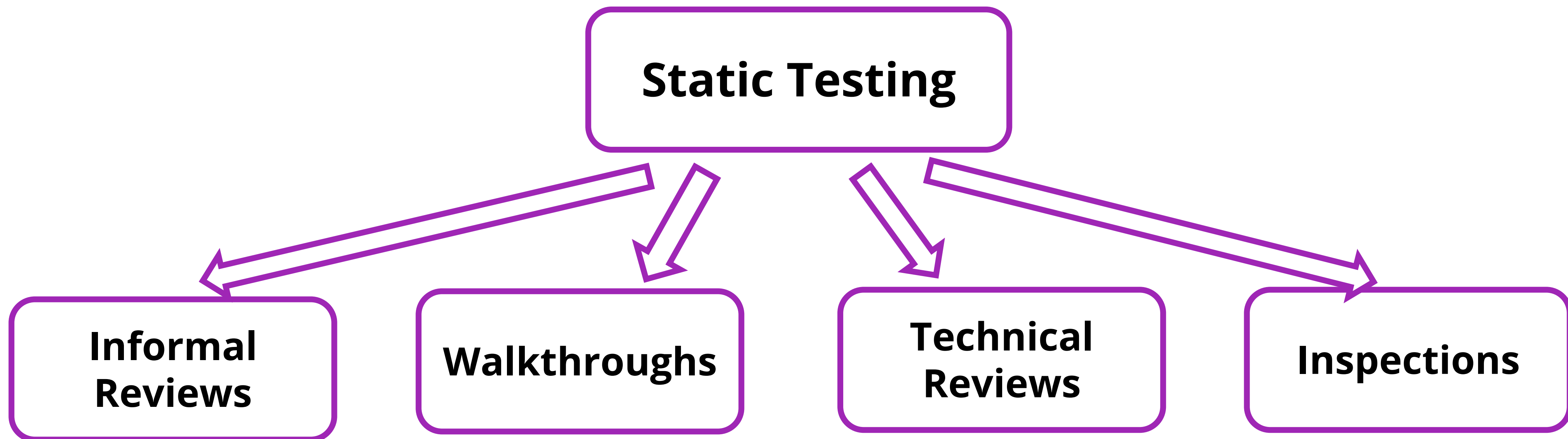

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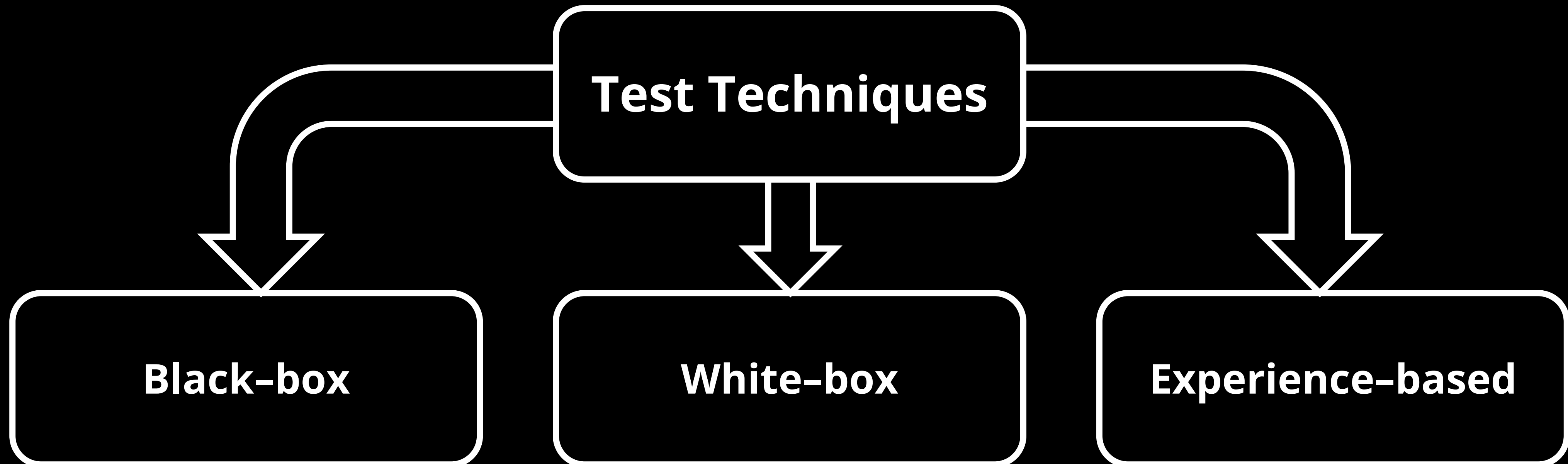
TEST TECHNIQUES

The purpose of a test technique, including those discussed in this section, is to help in identifying test conditions, test cases, and test data.



BLACK BOX

Equivalence Partitioning

Boundary Values Analysis

State Transition

Decision Tables

Use Case Testing

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EQUIVALENCE PARTITIONING

- **Equivalence partitioning (EP)** – A black-box test design technique in which test cases are designed to execute representatives from equivalence partitions.
- **Idea:** Divide (i.e. to partition) a set of test conditions into groups or sets that can be considered the same (i.e. the system should handle them equivalently), hence equivalence partitioning. In principle test cases are designed to cover each partition at least once.
- **Example:** Bank represents new deposit program for corporate clients. According to the program client has ability to get different %, based on amount of deposited money. Minimum which can be deposited in $1, maximum is – $999. If client deposits less than $500 it will have 5% of interests. In case the amount of deposited money is $500 and higher, then client gets on 10% of interests more.

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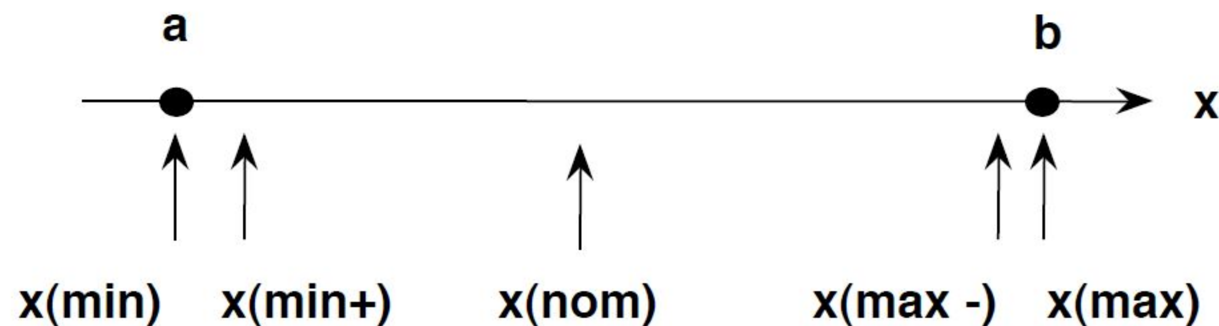
- **Boundary value analysis (BVA):** A black box test design technique in which test cases are designed based on boundary values.

  BVA is an extension of equivalence partitioning, but can only be used when the partition is ordered, consisting of numeric or sequential data. The minimum and maximum values (or first and last values) of a partition are its boundary values
- **Idea:** Divide test conditions into sets and test the boundaries between these sets. Tests should be written to cover each boundary value.



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- **Decision table** – A table showing combinations of inputs and/or stimuli (causes) with their associated outputs and/or actions (effects), which can be used to design test cases.
- **Idea:** Divide test conditions into constraints, which could get positive or negative meanings, and rules which identify output based on values of conditions. While analyzing each possible variant of positive and negative meanings identify output or set of outputs for each variant based on the rules. Only combinations of these positive and negative meanings, which uniquely identify decisions that are made, should be covered by tests.

Causes (inputs)	R1	R2	R3	R4	R5	R6	R7	R8
Over 60s rail card?	Y	Y	Y	Y	N	N	N	N
Family rail card?	Y	Y	N	N	Y	Y	N	N
Child also traveling?	Y	N	Y	N	Y	N	Y	N
Effects (Outputs)								
Discount (%)	50	34	34	34	50	0	10	0
Message*	+	+						

- 'over 60s' rail card – 34%
- family rail card and traveling with a child – 50%
- traveling with a child, but do not have family rail card – 10%
- only one type of rail card can be used

The rationalized table with a fewer columns and thus will result in fewer test cases:

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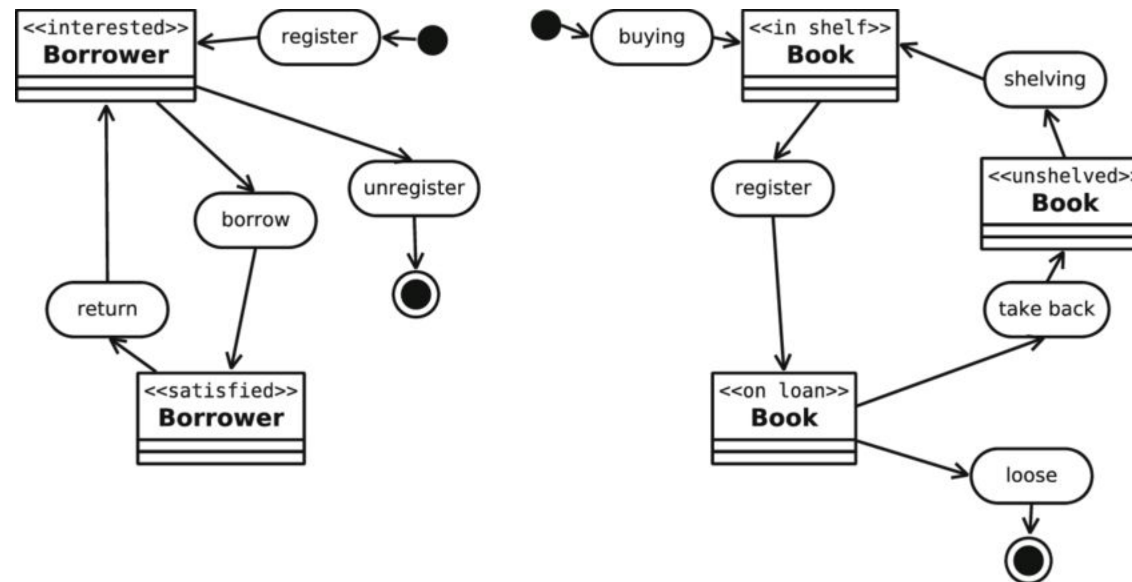
- **State transition testing** – A black box test design technique in which test cases are designed to execute valid and invalid state transitions.
  State transition – A transition between two states of a component or system.

- **Idea:** Design diagram that shows the events that cause a change from one state to another. Tests should cover each path starting from the longest state combination.



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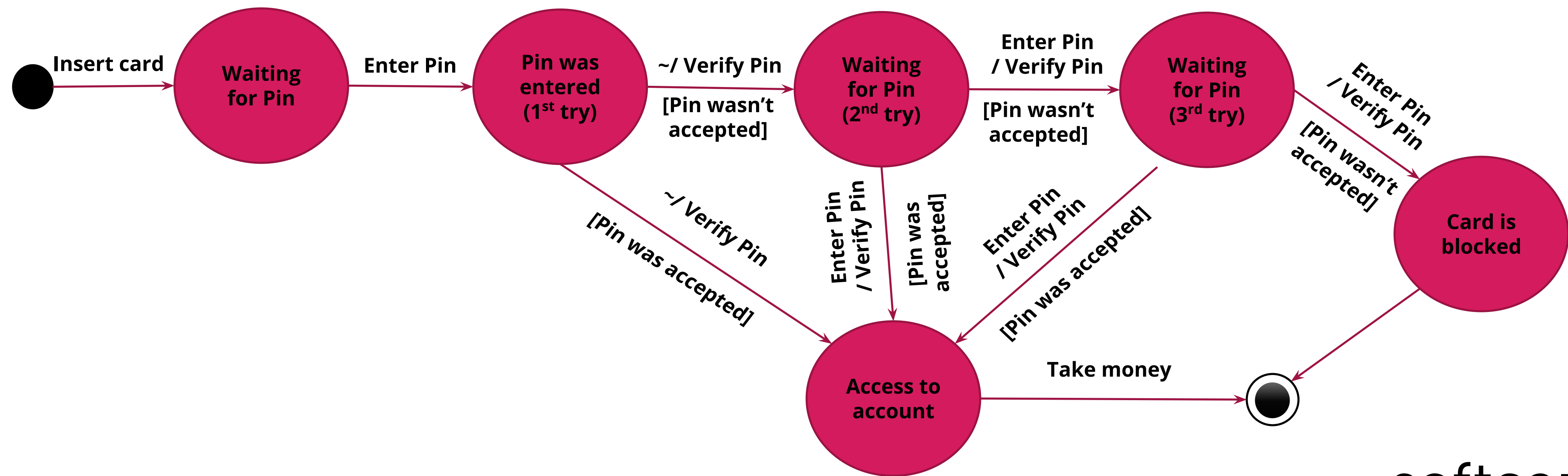
- **Example:** Client of the bank would like to take money from bank account using cash machine. To get money he should enter valid Personal Identity Number (PIN). In case of 3 invalid tries, cash machine eats the card.



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WHITE BOX

Statement

Decision

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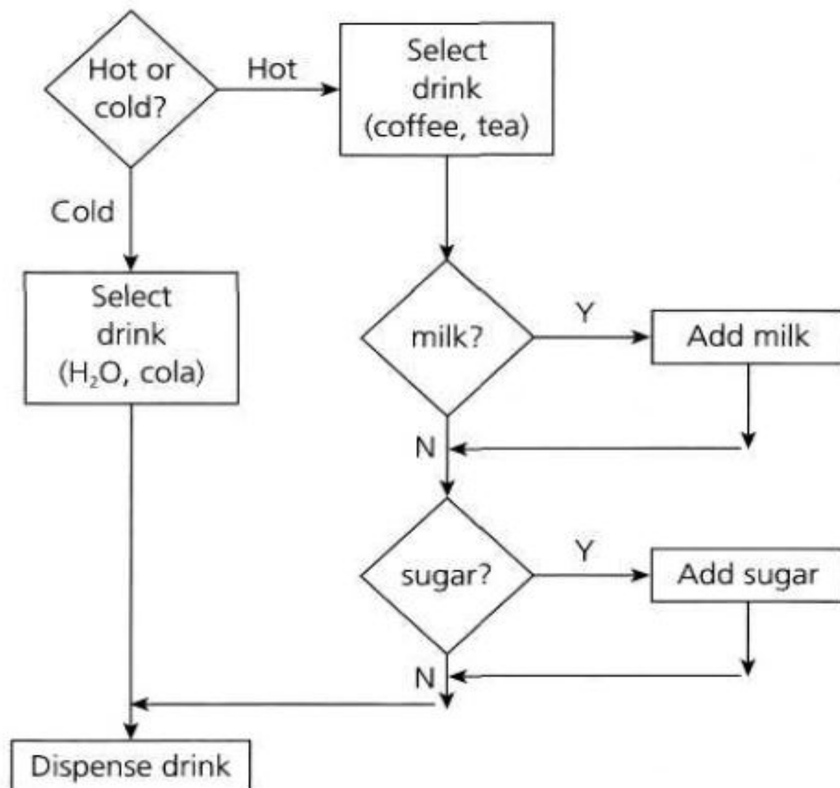
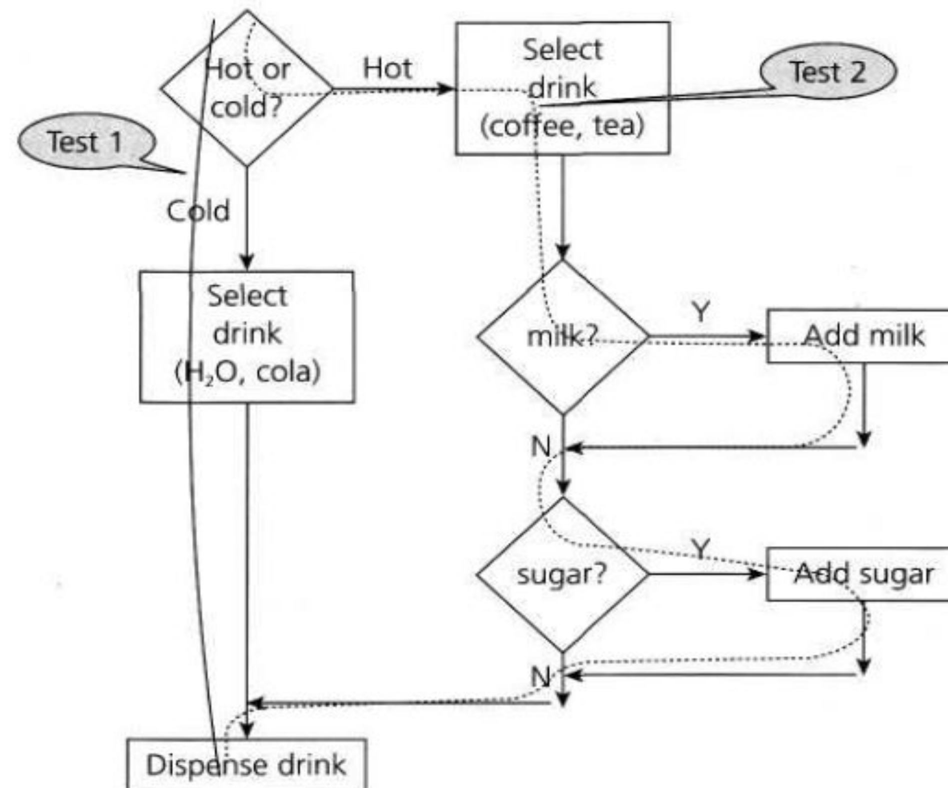
Statement Testing and Coverage*

- **Statement** – an entity in a programming language, which is typically the smallest indivisible unit of execution.
- **Example:**





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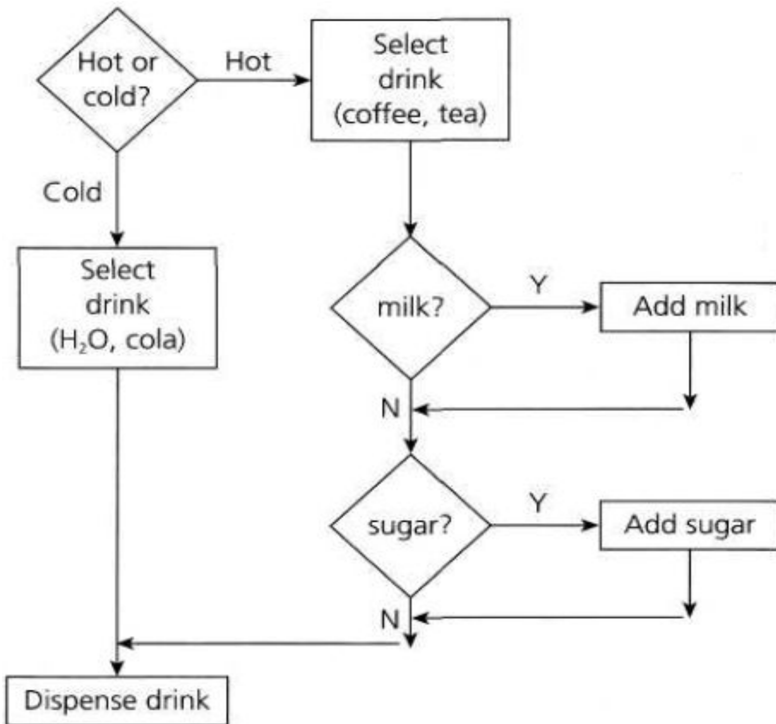
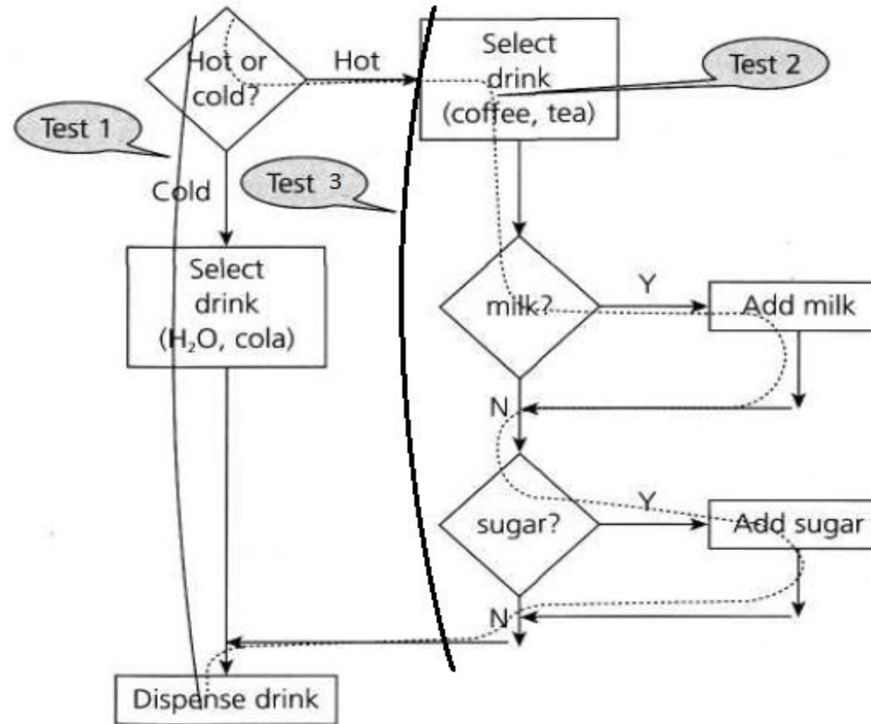
Decision Testing and Coverage*

- **Decision** is an IF statement, a loop control statement (e.g. DO-WHILE or REPEAT-UNTIL), or a CASE statement, where there are two or more possible exits or outcomes from the statement.
- **Example:**





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EXPERIENCE BASED

Error Guessing

Exploratory Testing

Checklist-based Testing

WHO'S NEXT?

YOU'RE NEXT

#STUDYHARD

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Q&A