Software Quality Assurance

Software Reliability Engineering

Objectives

- Define the term "operational profile"
- Construct an operational profile for a software product
- Explain how the operational profile can be used to determine test selection for a given user base

Discussion: MSOE Scheduler 2

Pretty cool...

Not bad but can't

Schedule

Can not log in anymore...

Discussion: MSOE Scheduler 23

Look@ schedule options

List closed courses.

List courses needs to graduate.

List electives.

List courses in progress.

Operation

- *Operation*
  - –major system logical task performed for initiator, which returns control to system when complete.
  - –Extremely similar to a use case scenario
- *Examples: Phone System*
  - –Process fax call
  - –Phone number entry
  - –Audit section of phone number database
  - –Etc.

operations which return control back to user

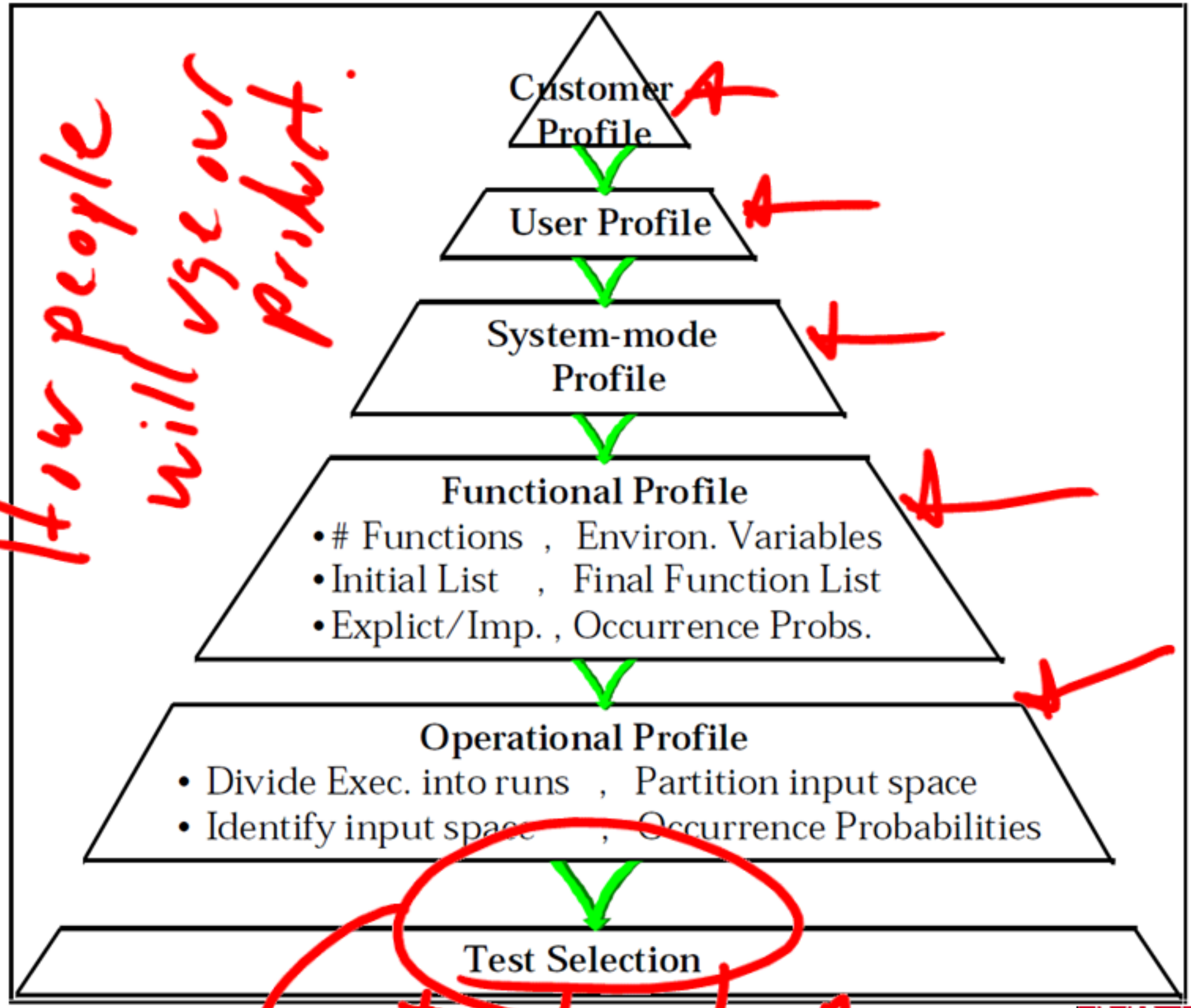
iPhone Operations

Operation Description	Number of times performed	Percentage
Send Text Message	300	12.5
Send e-mail	20	≈1%
Make phone call	10	≈.5%
Take Picture	1000	40.5
Take HD Video	5	≈.25%
Print photos via internet	0	0%
Play Game	Big # 1000	40.5
Make video call	5	≈.25%
GPS	10	≈.5%
Listen to music	35	≈1.25%
Browse Internet	~75	≈2.5%
Read textbooks	5	≈.25%
	2465	100%

1 week

Developing an Operational Profile

How people will use our product.



tests to Run.

Customer Profiles and Types

- customer profile
  - an array of independent customer types.
- A customer type
  - one or more customers in a group that intend to use the system in a relatively similar manner.

- Individual Purchasers
- Corporate Users
- Government users.

- User Profile
  - The set of all user types and their associated probabilities of using the system

User Profiles

- Individual Users
  - ⇒ Professor
  - Teenager
  - College Student
  - "Dad"

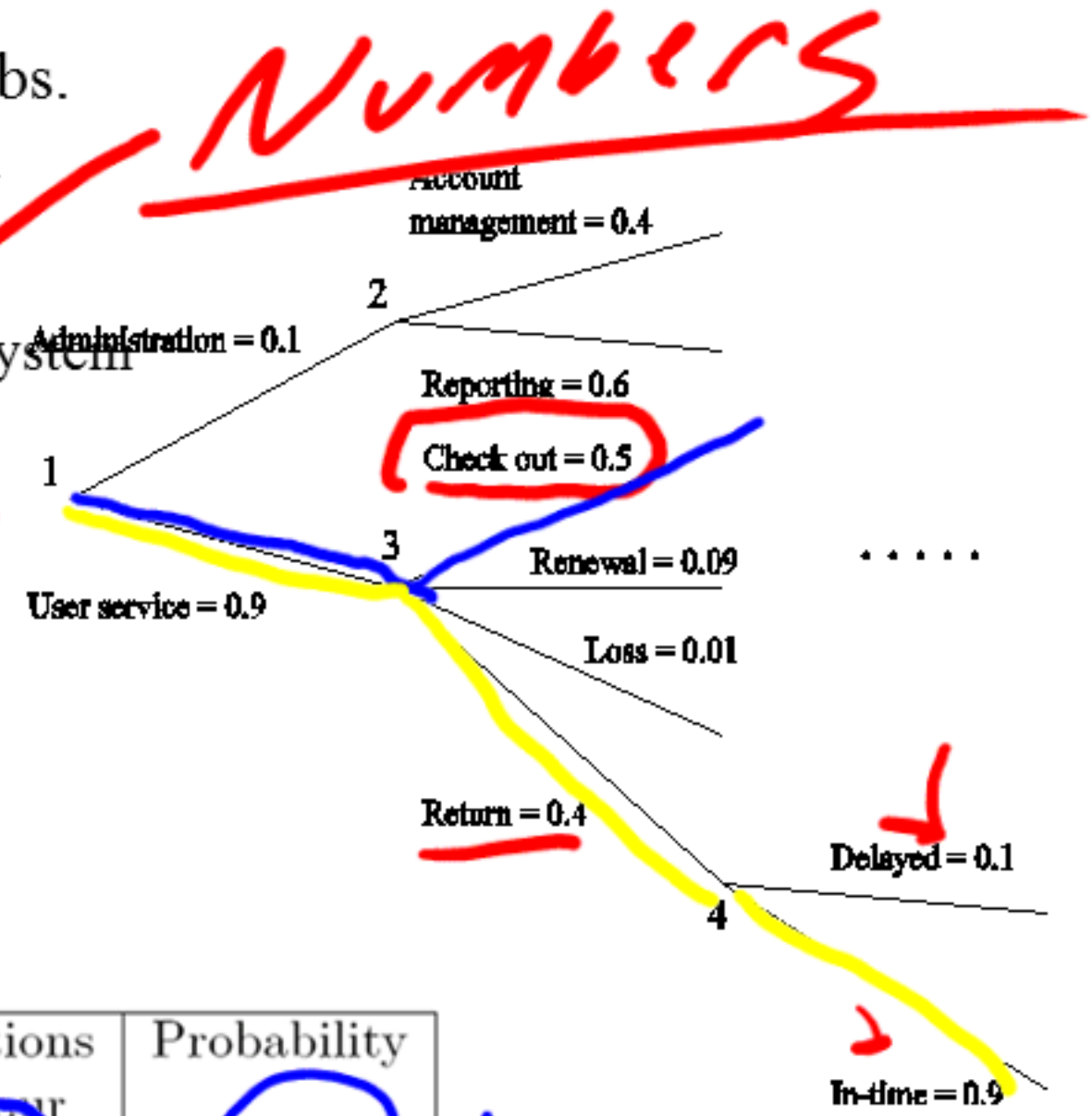
Function Profile

- Function profile is made up of tasks
  - Tasks -> an action that an external entity can perform on the given system.

Generally between 20-100.
⇒ Size varies based on complexity, number of users, functional breath, etc.

Operational Profiles

- Developed at AT&T Bell Labs.
- An OP describes how actual users operate a system.
  - An OP is a quantitative characterization of how a system will be used.
- Two ways to represent operational profiles
  - Tabular
  - Graphical



Operation	Operations per hour	Probability
Book checked out	450	0.45
Book returned in time	324	0.324
Book renewed	81	0.081
Book returned late	36	0.036
Book reported lost	9	0.009
...	...	...
Total	1000	1.0

Generating a functional profile

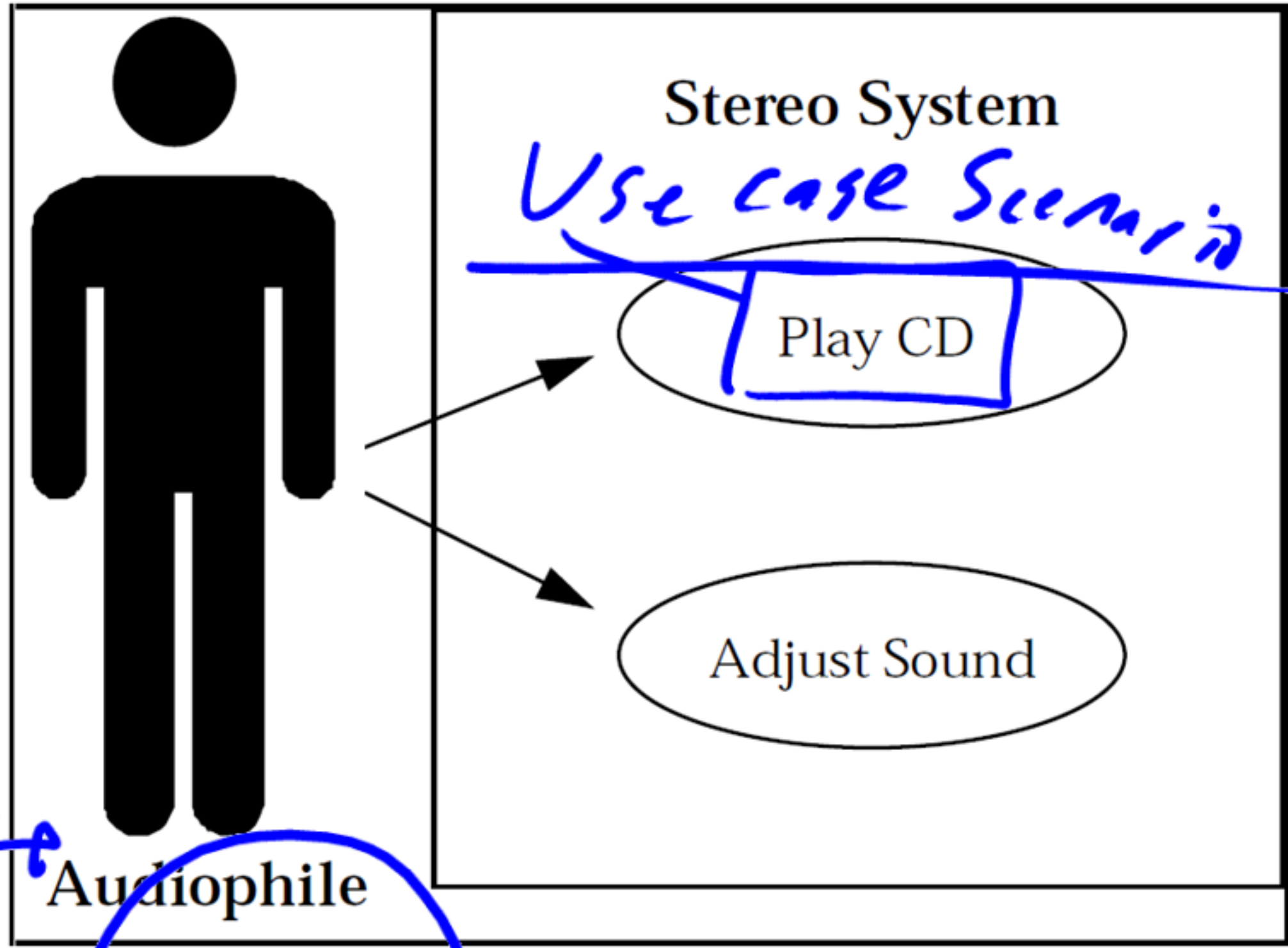
Generate an initial function list

Determine environmental variables.

Create a final function list.

Assign occurrence probabilities.

Building an Operational Profile



Use Case Scenario

- **Use Case: Play CD**
- **Actors: Audiophile**
- **Description:**
  - **(1) Audiophileselects a CD**
  - **(2) Audiophile inserts the CD**
  - **(3) Audiophile selects a track**
  - **(4) Audiophile presses play**
  - **(5) System plays the CD**
- **Precondition:**
  - **System turned on**
- **Postcondition:**
  - **Stop at end of CD**

Already CD loaded

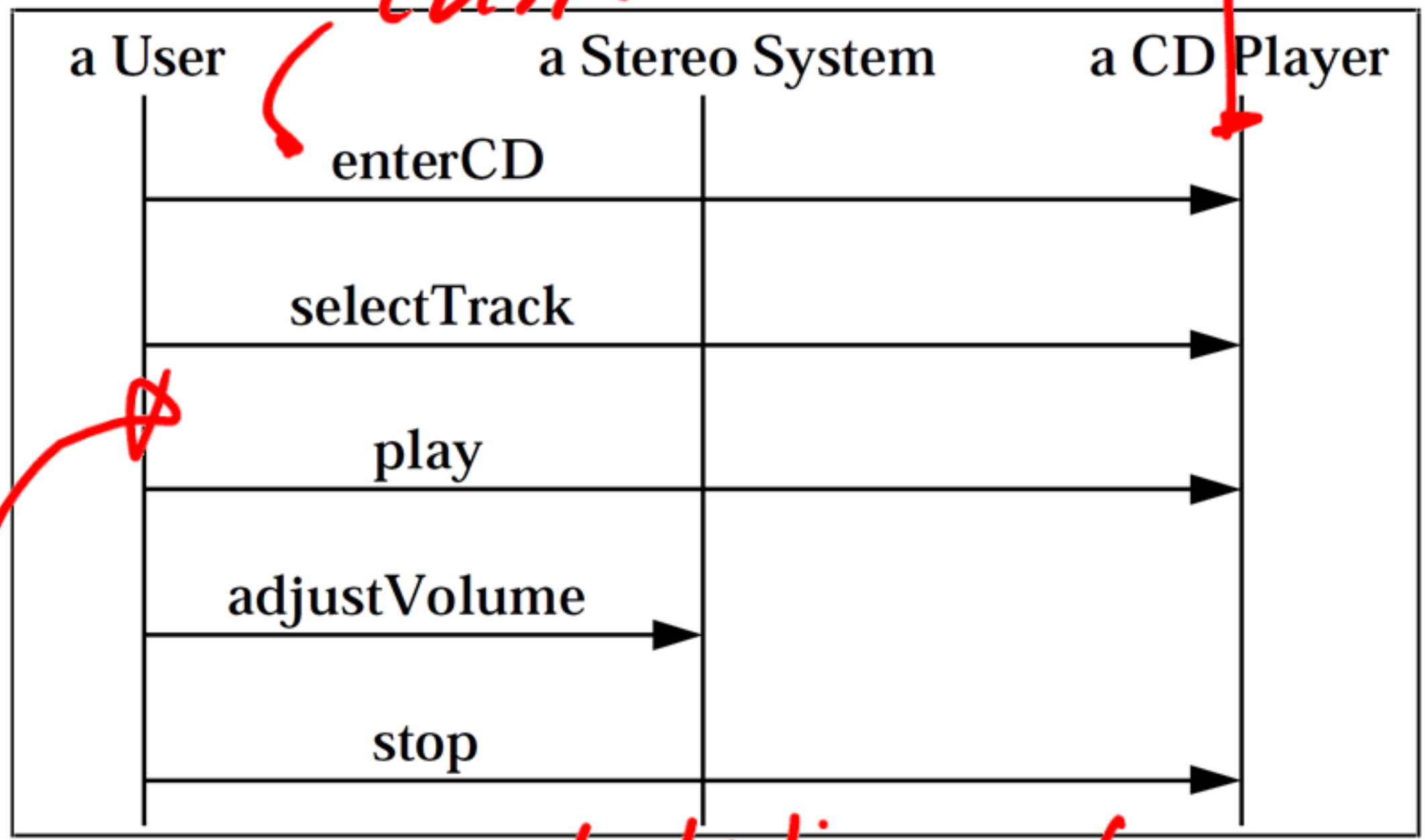
CD is bad

AF

Events versus scenarios

- Events
  - An external stimulus to an object
- Scenario
  - A sequence of events

UML Sequence Diagram



event

Probability of occurrence.

Use cases and events

- Use case is similar to a _____
- A set of events is similar to a(n) _____

Use Cases and short scenarios

Use Case	Actor	Scenario
Cash Withdrawal	Bank Customer	Wrong PIN entered once, request $75
	Bank Customer	PIN OK, deposit $300, request $50
	Crook	Stolen card inserted, valid PIN entered
ATM Cash Restocking	Operator & Guard	ATM opened, cash dispenser empty, $15,000 is added
	Operator & Guard	ATM opened, cash dispenser is full

Operational Variables and Expected Results

Operational Variables				*Expected Result*	
Card PIN	**Entered PIN**	**Customer Bank Reply**	**Customer Acct. Status**	**Message Displayed**	**Card Action**
Invalid	-	-	-	Insert ATM Card	Eject
Valid	Matches Card PIN	OK	Closed	Account Closed	Eject
Valid	Matches	OK	Open	Enter Amount	Keep
Valid	Matches	No Reply	-	Try Later	Eject
Valid	Doesn't Match	-	-	Reenter PIN	Keep
Revoked	-	Bank Replies	-	Card Revoked	Retain
Revoked	-	No Reply	-	Card Invalid	Eject

test events

Putting it all together

What is an OP?

Well

⇒ Set of all operations based upon how often they are done in a given system.