



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 2008



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*

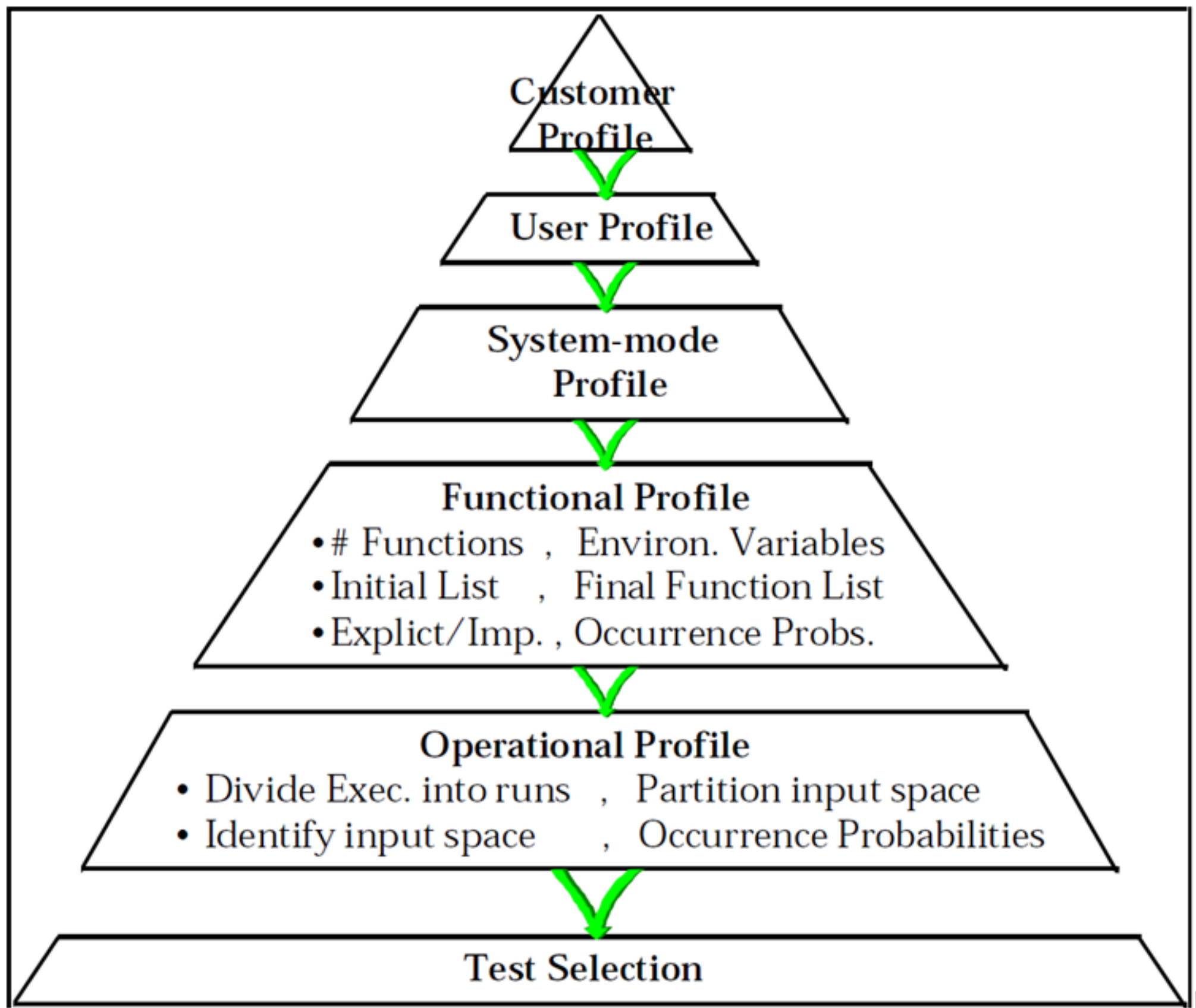
- Process fax call

- Phone number entry

- Audit section of phone number database

- Etc.

Developing an Operational Profile



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.

User Profiles

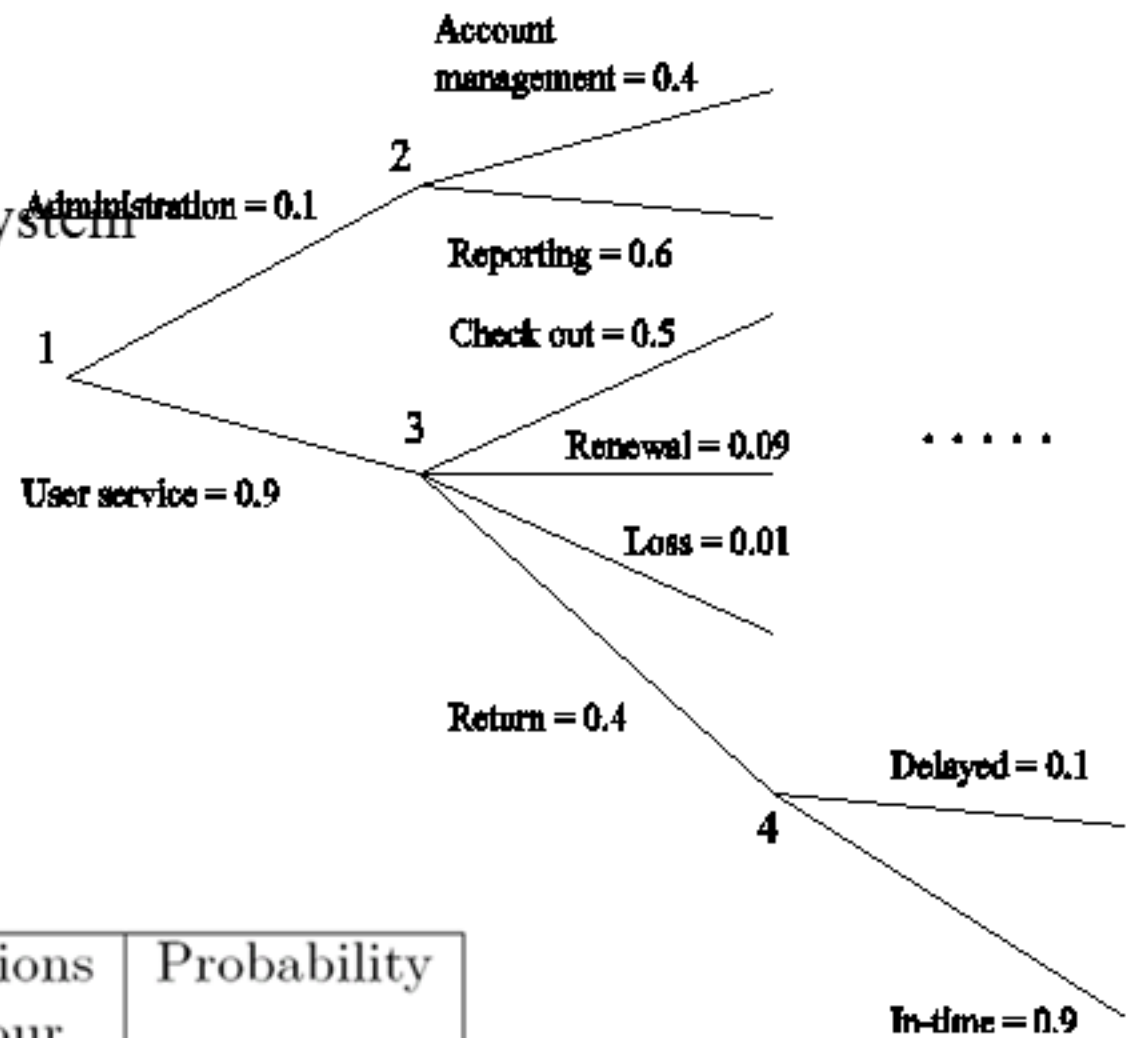
- User Profile
 - The set of all user types and their associated probabilities of using the system

Function Profile

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

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

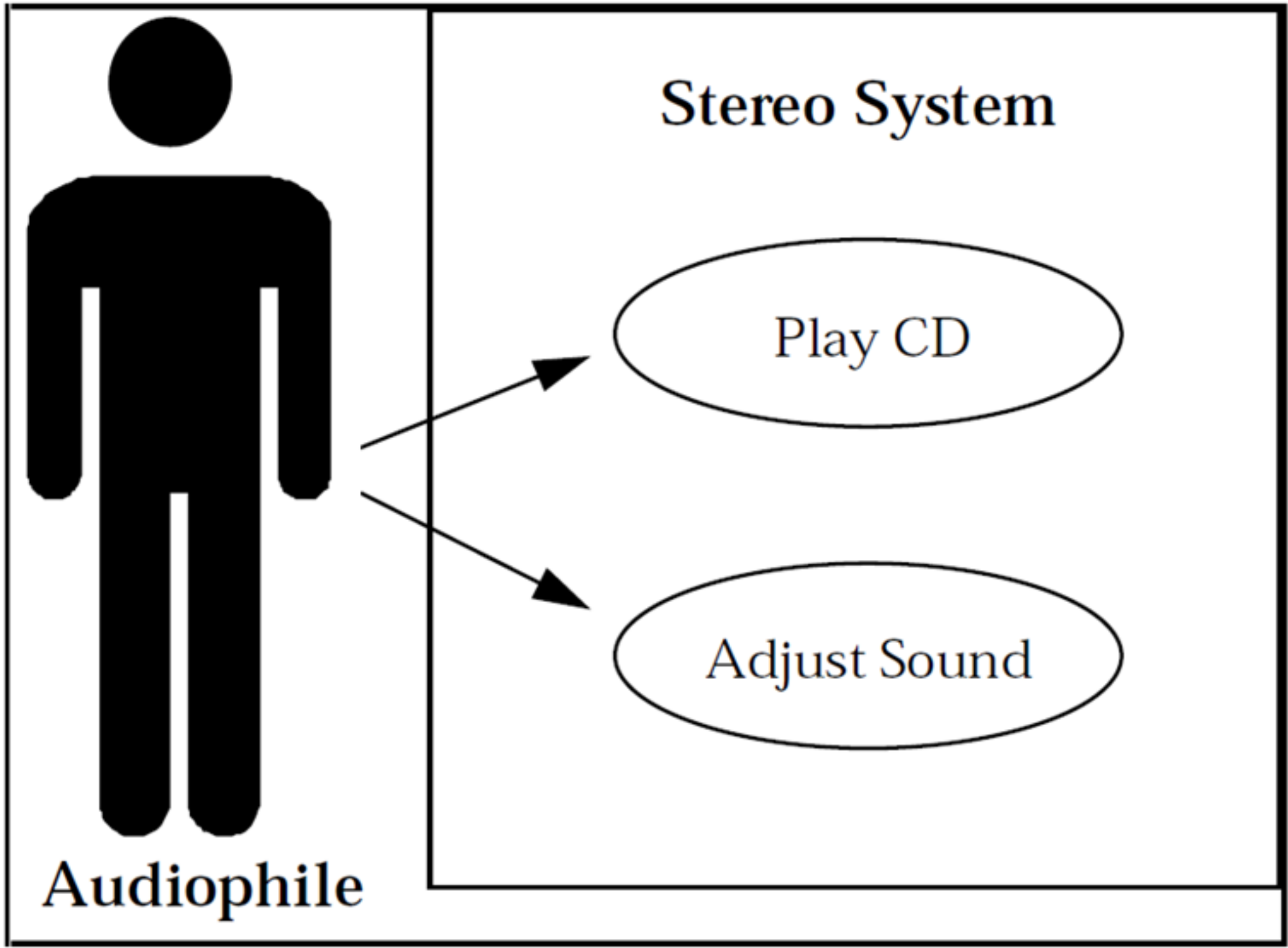
Determine environmental variables.

Create a final function list.

Assign occurrence probabilities.

Building an Operational Profile

Profile



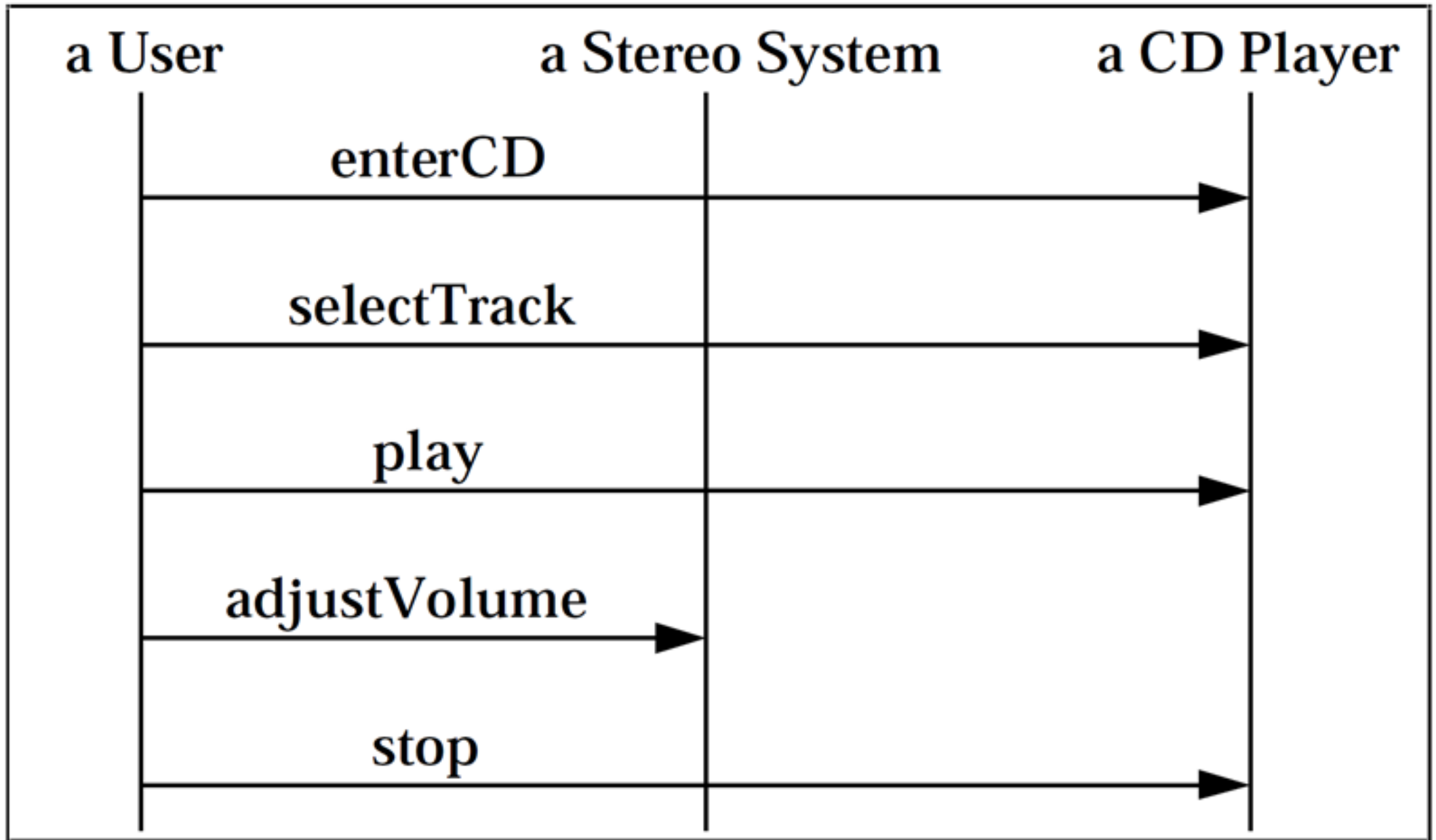
Use Case Scenario

- **Use Case: Play CD**
- **Actors: Audiophile**
- **Description:**
 - (1) Audiophile selects 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

Events versus scenarios

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

UML Sequence Diagram



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

| <i>Operational Variables</i> | | | | <i>Expected Result</i> | |
|------------------------------|------------------|---------------------|-----------------------|------------------------|-------------|
| 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 |

Putting it all together