Specifications and the GroupThink exercise

Please from groups of 5-6 students.

Add a group name here: PollEv.com/renejust859

Background

- GroupThink exercise: in-class activity
  - Developed by Michael Ernst & John Chapin, MIT UPOP Program
- Provides experience with building a specification from a set of requirements as part of a team
- Demonstrates the challenge of making sure everyone is on the same page

Time plan

- 12:30-12:40 Intro and set up
- 12:40-12:55 Team discussions
- 12:55-1:15 Game – 5 questions
- 1:15-1:20 Scores and discussion

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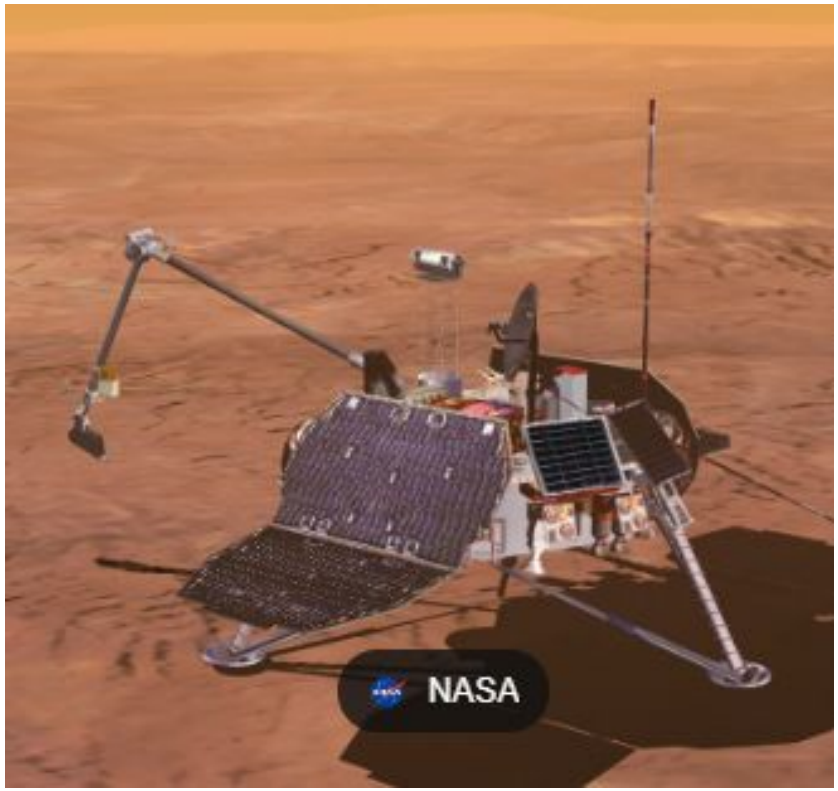
Bundestag Sound System, 1992

No sound from speakers in new building

- system requirement: no feedback
- new all-glass room

"This glass does not absorb the sound. The computers, detecting feedback, turn down the volume. A steady state is only achieved when the microphones are turned off."
- Dr. Debora Weber-Wulff

Mars Polar Lander, 1999



Crashed while landing on Mars

- Sensor felt vibrations when legs deployed
- Software interpreted vibrations as vehicle had landed
- Engine shut down during descent – 40 meters above the surface

"There was no software requirement to clear spurious signals prior to using the sensor information to determine that landing had occurred."

- Mars program independent assessment team

Specifications matter

- A specification:
  - connects customer and engineer
  - ensures parts of implementation work together
  - defines correctness of implementation
- Therefore, everyone must understand specs
  - Designers, implementers, testers, managers, marketing, technical support, ... users!
- Good specifications are essential
- It's difficult to create a specification that is complete, consistent, precise, and concise

GroupThink game

Set up:

- As a team, specify behavior of a desktop telephone
- Individually, answer questions about its behavior

Goal:

- All team members give same answer
  (there are multiple correct answers)
- No defaults based on the game (e.g., “always A”)

Desktop telephone

Handset (speaker and microphone)

Keypad

- **`talk`**
- **`redial`**
- **`ansmachine`**
- **`end`**

24-character display

Answering machine

Current Design Document

General requirements and specification:

https://homes.cs.washington.edu/~rjust/courses/CSE403/phone_spec.html

or

https://tinyurl.com/3ujt3dv6

Requirements

- Display indicates current functionality
- Answering machine picks up after 2 rings

You decide other aspects of system behavior

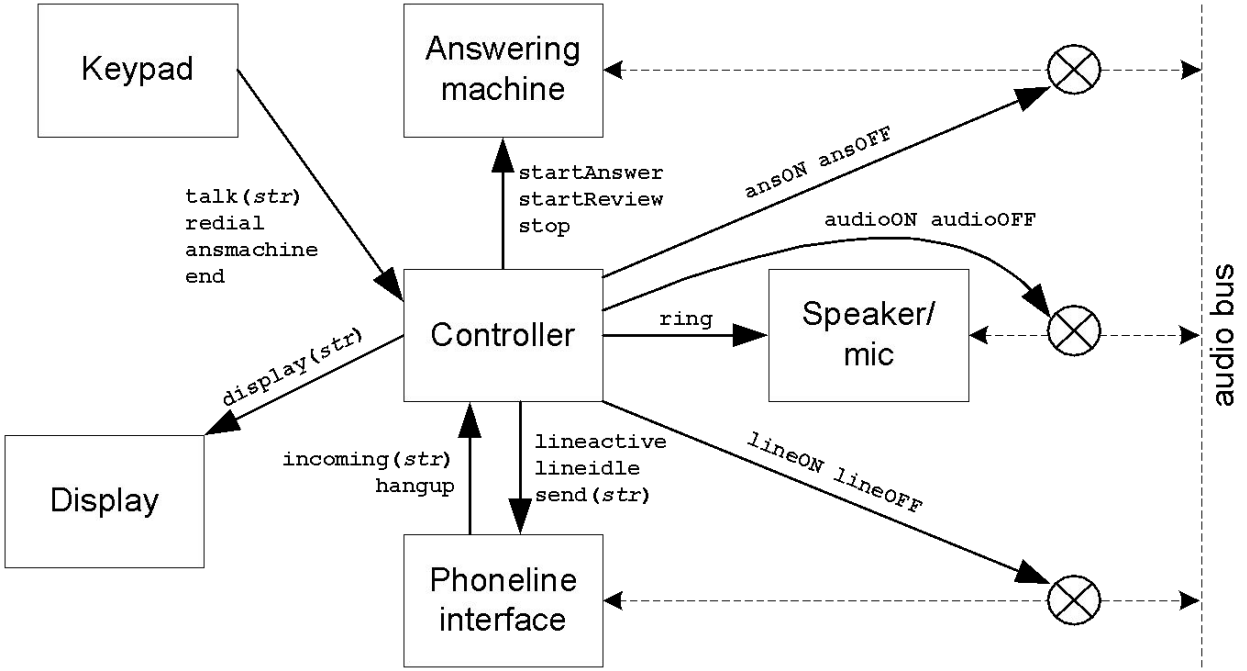
https://tinyurl.com/3ujt3dv6

Definitions

- **lineidle**: The phone is hung up or "on hook." Your phone uses the ***end key*** instead.
- **lineactive**: The phone is picked up or "off hook." Your phone uses the ***talk key*** instead.
- **ring signal** A signal sent over the phone line, which causes a traditional phone to ring. The phone company only sends a ring signal **if** it detects the **lineidle state**.

https://tinyurl.com/3ujt3dv6

System architecture



Goal: specify behavior based on system state

https://tinyurl.com/3ujt3dv6

Example question

The user is connected to an outside party.
The outside party hangs up.

What state is the phoneline in?

A. Lineactive (the user hears dialtone)
B. Lineidle (the user does not hear dialtone)

Individually write your answer (A or B) on a piece of paper, fold, and put in middle of table.

Put your answer on PollEv: PollEv.com/renejust859.

Scoring

Open the papers

1. Score the number of points equal to the count of your most common answer

2. If the count of your most common answer is 4 or more (close to your whole team answered the same), you'll get 10 points

Raise hand when everyone on team has answered and write down your score

As a team

You have 15 minutes to discuss and agree on the system's behavior

Then we'll ask you some more questions about it
(that you'll answer individually)

Phone spec: https://tinyurl.com/3ujt3dv6

PollEv: PollEv.com/renejust859

Groupthink Game Questions

The user makes a phone call to **`253-1234`**.
While still connected, the user presses **`redial`**.
What happens?

A. No action occurs
B. Dials 253-1234
C. Makes line go lineidle, dials 253-1234
D. Makes line go lineidle, makes line go lineactive, dials 253-1234

The user is connected to an outside party.
The outside party hangs up.
What state is the phoneline in, can the user hear dialtone?

A. The phoneline is lineactive, and the user hears dialtone until the user presses **`end`**

B. The phoneline is lineactive; the user does not hear dialtone because the **`lineOFF`** message has been sent

C. The phoneline is lineactive; the user does not hear dialtone because the **`audioOFF`** message has been sent

D. Both B and C

E. The phoneline is lineidle, and the phone will ring if the phone company sends a ring signal

The user enters **`2530945`**.
Before the user presses **`talk`**, the phone company sends a ring signal.
Then, the user presses **`talk`**.
What happens?

A. The telephone makes the outgoing call; the incoming call gets a busy signal
B. The telephone makes the outgoing call; the incoming call is hung up on
C. The user is connected to the incoming call, then both parties hear the 7 touchtones for "2530945" played over the line
D. The user is connected to the incoming call, and neither party hears the touchtones

The phone company sends a ring signal with a caller ID string that is 30 characters long. What is the final state of the display?

A. Displays first 24 characters
B. Displays last 24 characters
C. Displays last 6 characters
D. Repeatedly displays entire caller ID info, 24 characters at a time

The phone rings, and after 2 rings, the answering machine picks up.
The user presses `talk` while the caller is recording a message.
What happens?

A. The answering machine continues to record; the user cannot speak to the caller
B. The answering machine continues to record; the user can speak to the caller
C. The answering machine stops recording; the user cannot speak to the caller
D. The answering machine stops recording; the user can speak to the caller

Scores and discussion

3 answers acceptable

The user makes a phone call to 253-1234.
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All answers acceptable

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2 answers acceptable (A is non-standard)

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X C. The answering machine stops recording; the user cannot speak to the caller

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Specifications: Wrap up

What happened in the game

- Created a specification
  - how did you approach the task?
  - did you write it all down?
- Saw its limitations
  - how would you revise it?
  - what ideas will you use in your project?

Why are specifications hard?
Technical view

- Complete
  - **last-number memory changed by `TALK` during call?**
- Consistent
  - **what to display if call arrives when reviewing msgs?**
- Precise
  - **does `tones(string)` send tones to audio bus?**
- Concise
  - **did you understand it?**

Why are specifications hard?
Management view

- This is where the fight happens between what you want and what you can have

- Include
  - all stakeholders
- Decide
  - smoothly and rapidly
- Satisfy
  - all constraints