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User Interface Development
User Interface

- Hardware + software that let user interact with system.
- Different systems have different requirements.
User interface can be graphical
User interface can be non-graphical
Futuristic UI
Developing good user interface is not easy...
As user interface design should not end up (enabled.com)
User Interface Models

Real-world experiences:
Tasks, processes, tools, results

User's conceptual model
Adapted from [IBM92]

User's model
Programmer's model
UI design principles, guidelines

Designer's model
Platform, operating system, development tools, guidelines

Programmer's model
Look-and-Feel Iceberg
adapted from [IBM92]

Presentation (Look)
- visual representations
- aesthetics

Interaction (Feel)
- techniques
- style

Architecture (Behaviour)
- organisation
- properties
- algorithms
Good Looking is Not Enough!
To begin...

Understand your users

遵守 User Goals
- What are they trying to accomplish?
  - Reduce manual labour? Reduce human errors?
  - Increase productivity? Enhance customers' experience?

遵守 User Requirements
- What do they need to accomplish their goals?
  - Simpler UI? Smarter system? Better functionality?
Next, design...

Golden Rule of Design

Don't do to others what you don't wish.
Golden Rule #1: Place Users in Control

- Use modes judiciously.
- Allow users to use either keyboard or mouse.
- Allow users to change focus.
- Display descriptive messages and text.
- Provide immediate and reversible actions and feedback.
- Provide meaningful paths and exits.
- Accommodate users with different skill levels.
- Make the user interface transparent.
- Allow users to customise the interface.
- Allow users to directly manipulate interface objects.
Golden Rule #2: Reduce Users' Memory Load

- Relieve short-term memory.
- Rely on recognition, not recall.
- Provide visual cues.
- Provide defaults, undo and redo.
- Provide interface shortcuts.
- Promote an object-action syntax.
- Use real-world metaphors.
- Use progressive disclosure.
- Promote visual clarity.
Golden Rule #3: Make the Interface Consistent

- Sustain the context of users' tasks.
- Maintain consistency within and across products.
- Keep interaction results the same.
- Provide aesthetic appeal and integrity.
- Encourage exploration.
Not only UI...

- UI development is not only UI programming!
- UI has to work seamlessly with back end.
  - System design involves both UI and back end.
- Most people know only one thing...
  - Conventional software engineer doesn't know enough of UI.
  - UI / UX designer doesn't know enough of SE.
  - Game developer doesn't know enough of software design.
  - ...
  - Whoever can integrate takes the crown!
Summary

- Good UI makes a system usable.
- Understand users' goals and requirements.
- Apply appropriate UI design principles & guidelines.
- Design good system architecture.
- Develop well-tested UI programs.
Further Reading

- User interface models: [Mend97] chap. 3.
- UI design principles: [Mend97] chap 5.
References