Week 2-3
Design Principles: Part 1

SFWRENG 4HC3/6HC3 Human Computer Interfaces

** Slides adapted from previous instructors of COMPSCI/SFWRENG 4HC3/6HC3*

McMaster University

List of Usability & UX Goals

Usability

- Effectiveness
- Efficiency
- Safety
- Utility
- Learnability
- Memorability

UX Goals

- Satisfying
- Motivating
- Enjoyable
- Fun
- Entertaining
- Rewarding

- Helpful
- Emotionally fulfilling
- Aesthetically pleasing
- Supportive of creativity

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Week 2 Goals Overview

- ~~**Monday**~~
  - ~~Interface and Interaction~~
- **Wednesday**
  - ~~Usability and UX~~
- **Friday**
  - **Design Principles: Part 1**

WHY?

Why us as software engineers need to know HCD (in practice)?

- Sometimes you need to play the role of UX/UI designers
  - Small companies/teams don’t have enough resources
  - Advocate for user-centered products
- Know the bigger picture about what problem you are solving
  - Helps you better solve the problem
  - Helps when you transition to more senior roles (knowing the bigger picture)

Fundamental Design Principles

- **Discoverability (Visibility)**
- **Feedback**
- Conceptual Model
- Affordances
- Signifier
- **Mappings**
- **Constraints**

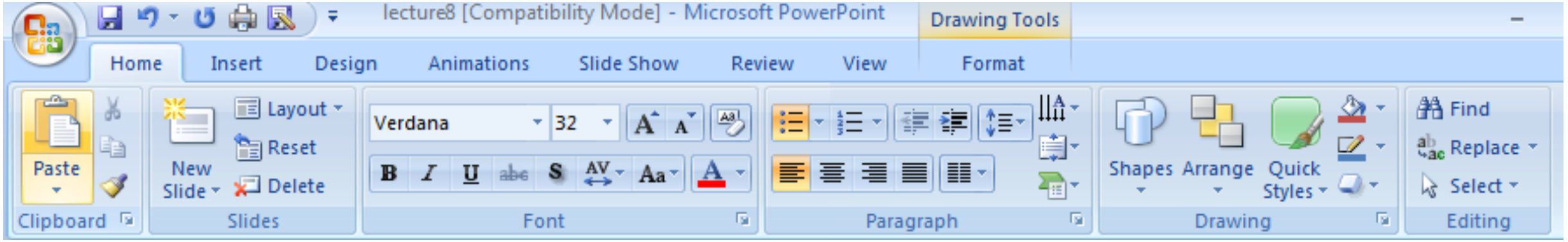
Seven Fundamental Design Principles *by Don Norman from "The Design of Everyday Things"*

Design Principles: **Discoverability**

Discoverability (Visibility) of **system capability**

- Make core user functions **clearly apparent**
  - (e.g., toolbars vs. menus)
- **Hide** secondary user functions
- **Visible properties guide users** as to what to do next
- **Structure** enhances discoverability

Discoverability: Example #1



Discoverability: Example #2

Structure Can Enhance Discoverability

Op.	Flights	Depart	Arrive	Aircraft	Duration	Connections	Tango	Flex	Latitude	Business Class (lowest)	Business Class (flexible)
Direct Flights											
	AC256	**05:45**	**09:09**	320	2hr24		**$189**	$326	$795	$858	$994
	AC260	**07:50**	**11:14**	321	2hr24		**$189**	$326	$795	$858	$994
	AC264	**10:45**	**14:09**	E90	2hr24		-	$348	$795	-	$994
	AC266	**12:30**	**15:54**	320	2hr24		$289	$326	$795	$858	$994
	AC276	**14:45**	**18:09**	319	2hr24		**$189**	$326	$795	$858	$994
	AC270	**16:20**	**19:42**	E90	2hr22		$289	$326	$795	$858	$994
	AC272	**18:45**	**22:09**	320	2hr24		**$189**	$326	$795	$858	$994
	AC262	**21:00**	**00:24** + 1 day	319	2hr24		**$189**	$326	$795	$858	$994
Connecting Flights											
1	AC8596	**07:05**	10:37	CRA	5hr19	Montreal (YUL)	-	$725	$1334	$1376	$1649
	AC411	12:00	**13:24**	320							
1	AC8596	**07:05**	10:37	CRA	7hr19	Montreal (YUL)	-	$595	$1334	$1376	$1649
	AC415	14:00	**15:24**	333							

Departs	Arrives	Flight Info	Econo	Flex	Plus
Winnipeg (YWG) Mon Oct 24 5:00 AM	Toronto (YYZ) Mon Oct 24 8:25 AM	WS 518 YWG to YYZ Nonstop | Duration 2h 25m Operated by WESTJET	N/A	$357.13 1 seat(s) left	$552.43
Winnipeg (YWG) Mon Oct 24 8:30 AM	Toronto (YYZ) Mon Oct 24 11:55 AM	WS 522 YWG to YYZ Nonstop | Duration 2h 25m Operated by WESTJET	N/A	$357.13 2 seat(s) left	$552.43
Winnipeg (YWG) Mon Oct 24 4:05 PM	Toronto (YYZ) Mon Oct 24 7:29 PM	WS 476 YWG to YYZ Nonstop | Duration 2h 24m Operated by WESTJET	N/A	$284.68	$552.43
Winnipeg (YWG) Mon Oct 24 7:45 PM	Toronto (YYZ) Mon Oct 24 11:10 PM	WS 536 YWG to YYZ Nonstop | Duration 2h 25m Operated by WESTJET	$189.13 6 seat(s) left	$357.13	$463.18 4 seat(s) left
Winnipeg (YWG) Mon Oct 24 9:30 AM	Toronto (YYZ) Mon Oct 24 6:53 PM	WS 3418 YWG to YQT Duration 1h 22m Operated by WESTJET ENCORE WS 3122 YQT to YYZ Duration 1h 53m Operated by WESTJET ENCORE 1 stop Total duration 8h 23m	$239.66 1 seat(s) left	$490.61	$730.01 2 seat(s) left
Winnipeg (YWG) Mon Oct 24 9:47 AM	Toronto (YYZ) Mon Oct 24 2:53 PM	WS 318 YWG to YOW Duration 2h 25m Operated by WESTJET WS 3465 YOW to YYZ Duration 1h 8m Operated by WESTJET ENCORE 1 stop Total duration 4h 6m	N/A	$425.51	$559.91 4 seat(s) left

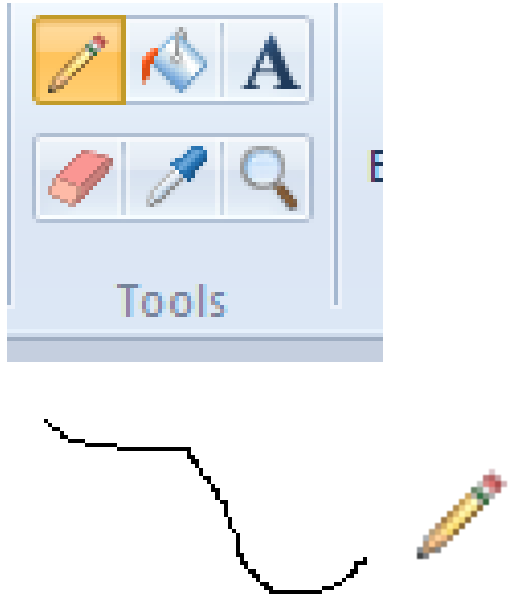
Design Principles: **Feedback**

Feedback for the user

- **Continuously inform** the user about what the system is doing
- How **the system** is **interpreting the user's input**
- User should at all times be aware of what is going on

Feedback: Example #1

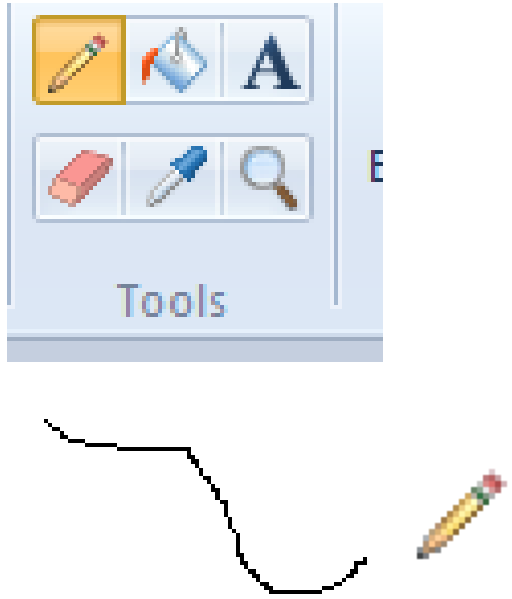
What type of feedback is being provided here?



Feedback: Example #1

What type of feedback is being provided here?

1. What item was selected
2. What mode the user is in now
3. How the system is interpreting the users actions



Design Principles: **Feedback**

Lack of feedback **relates directly** to one of Don Norman's gulfs

Which one is it and why?

Design Principles: **Feedback**

Lack of feedback relates directly to one of Don Norman's gulfs

Which one is it and why?

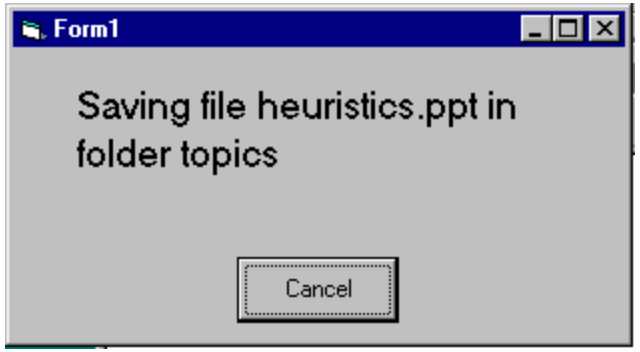
Gulf of evaluation

- User does not receive **enough information** from the system to construct an understanding
- User has trouble **interpreting system output** in light of their goals

Design Principles: **Feedback**

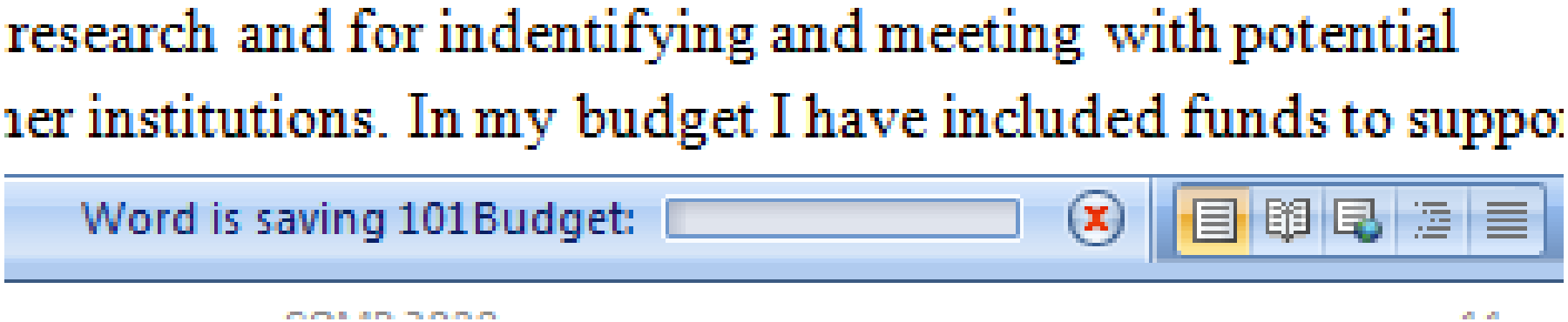
Feedback should be **as specific as possible** based on **user input**

vs.

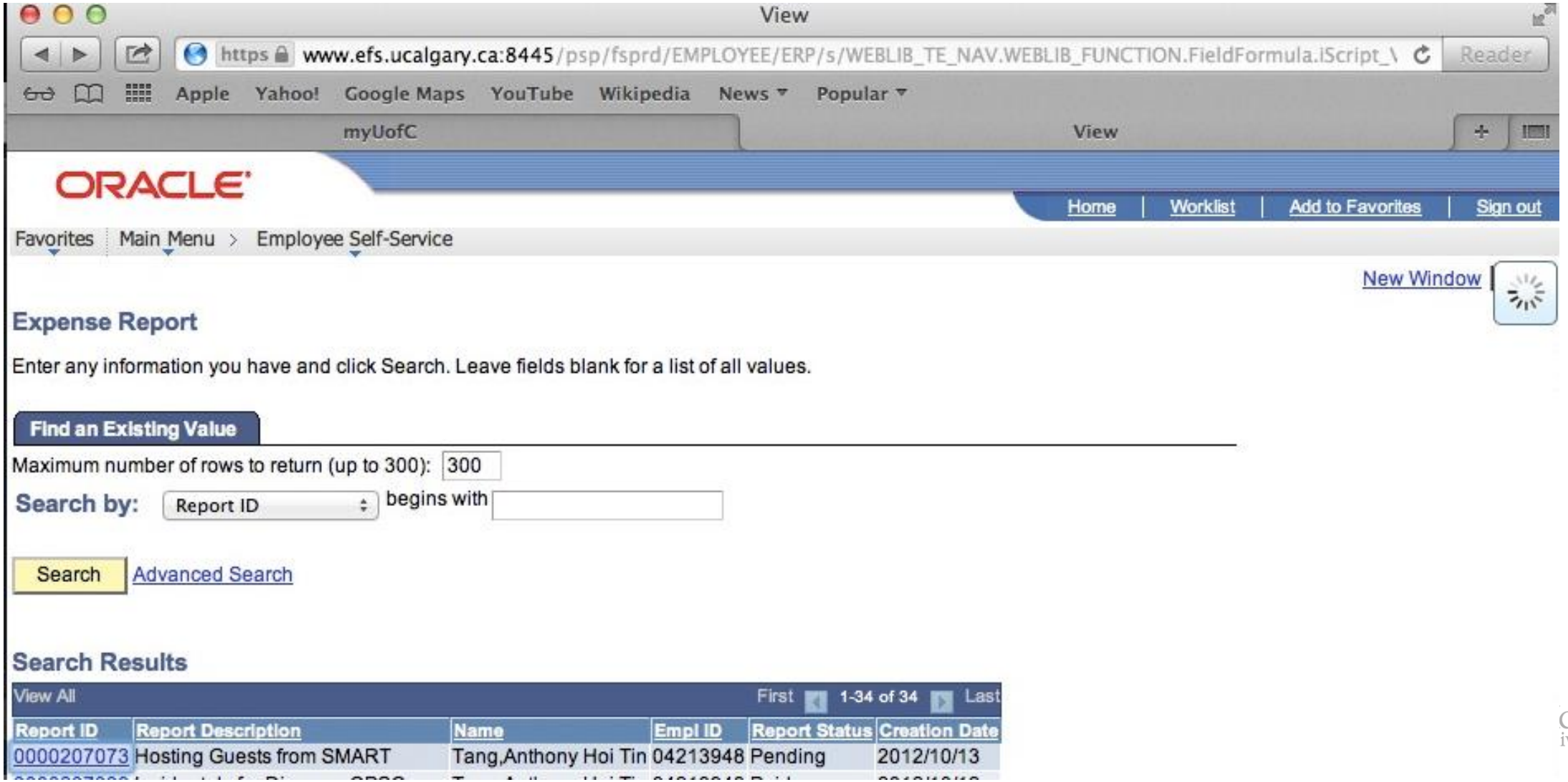


Design Principles: **Feedback**

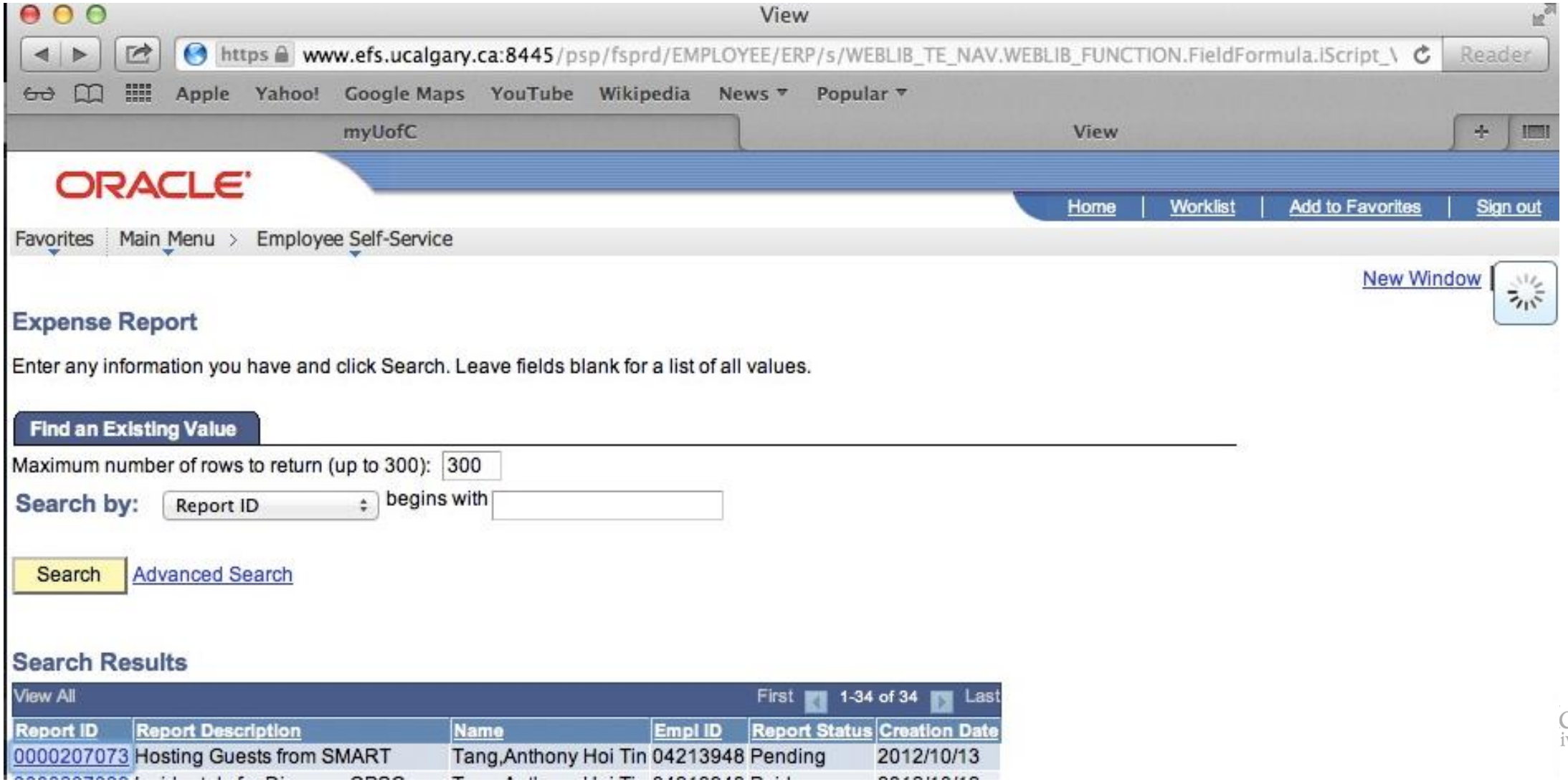
And ideally provided **in the context** of the user's action



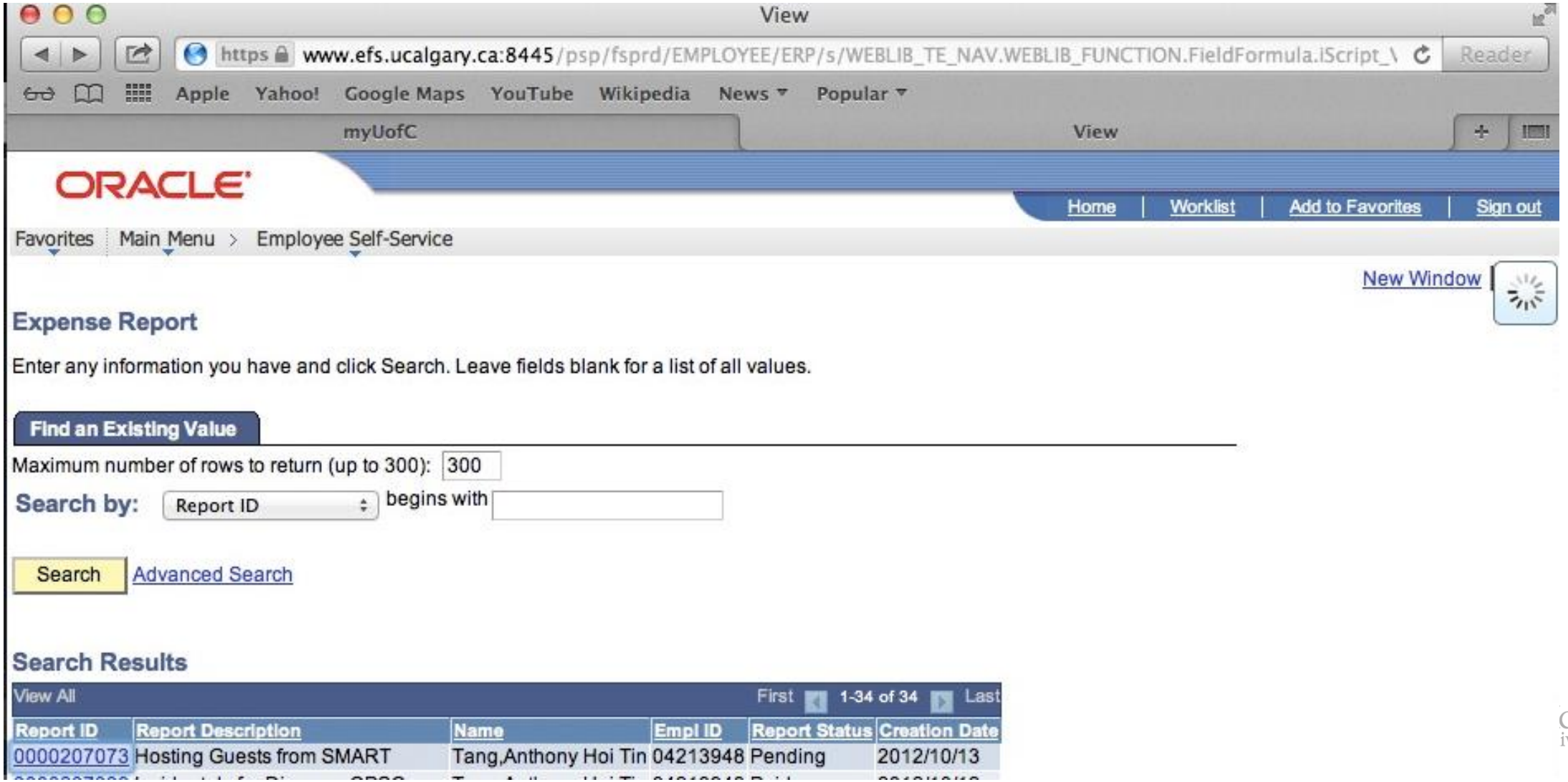
Feedback: Example #2



Example #2: **where did I click?**

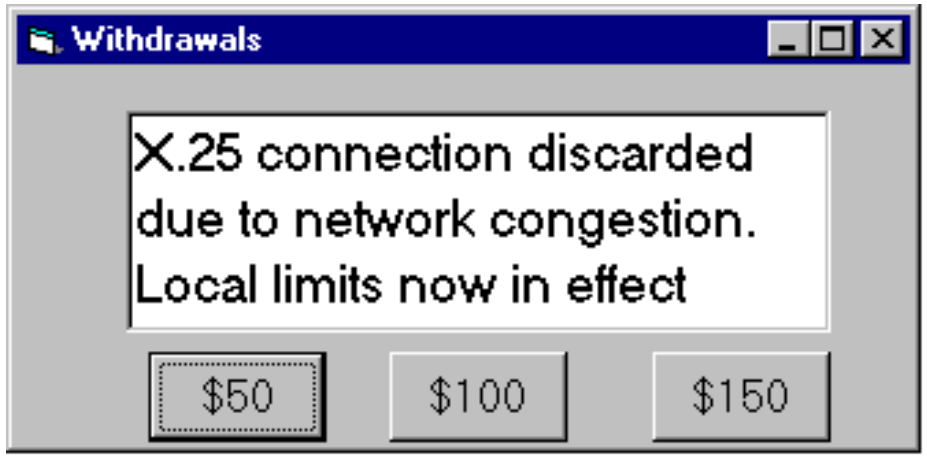


Example #2: **where is my feedback?**

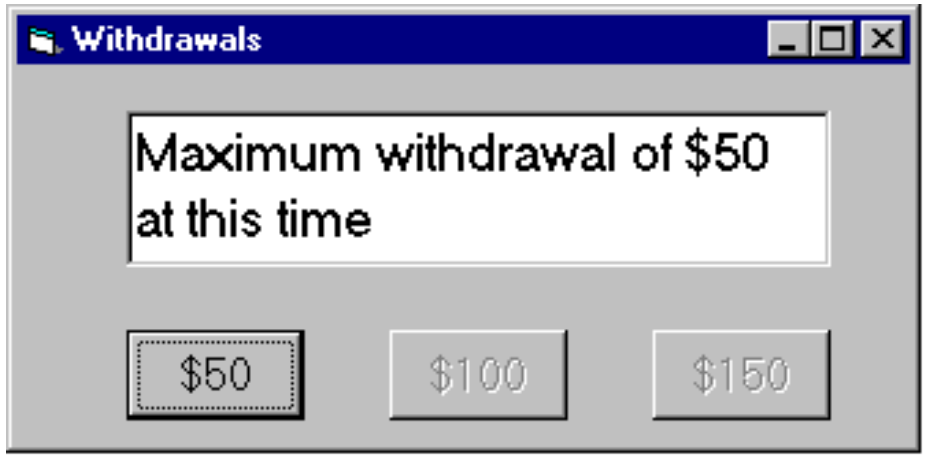


Design Principles: **Feedback**

System status feedback should be specific, **in the user's language**



vs.



Design Principles: **Feedback**

System status feedback should be specific, **in the user's language**

Could not login. Valid authentication credentials were not provided.

Design Principles: **Feedback**

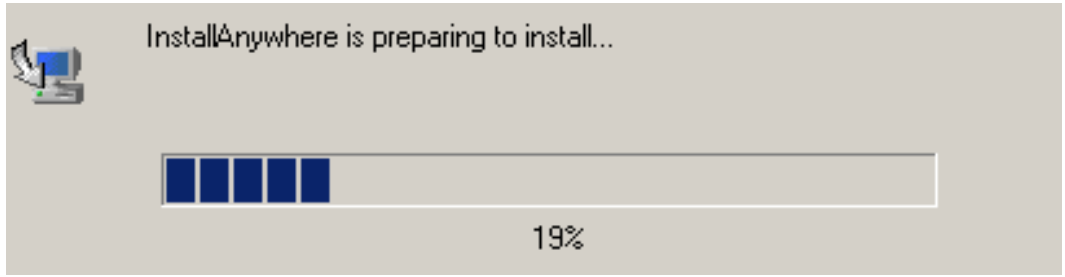
System status feedback should be specific, **in the user's language**

Could not login. Valid authentication credentials were not provided.

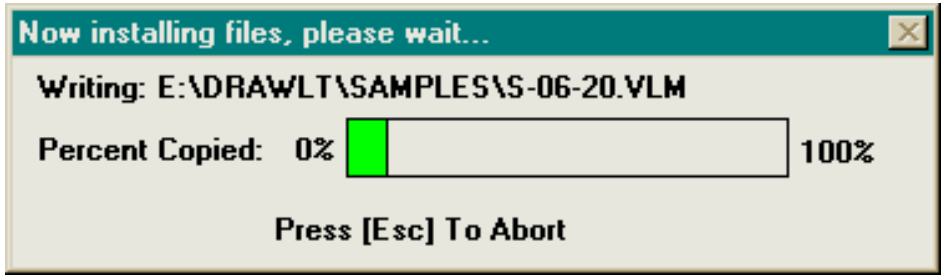
People know the words **"username"** or **"password."**

Design Principles: **Feedback**

With longer jobs, **the more detail** you can **provide on the status,** the better



vs.



Design Principles: **Feedback**

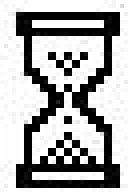
How users perceive delays for response time:

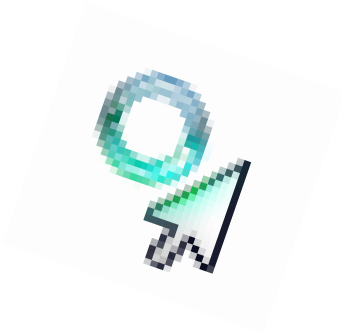
- 0.1 second max: perceived as “instantaneous”
- 1 second max: user’s flow of thought stays uninterrupted, but delay noticed
- 10 seconds: limit for keeping user’s attention focused on the dialog
- > 10 seconds: user will want to perform other tasks while waiting, i.e. get a cup of coffee

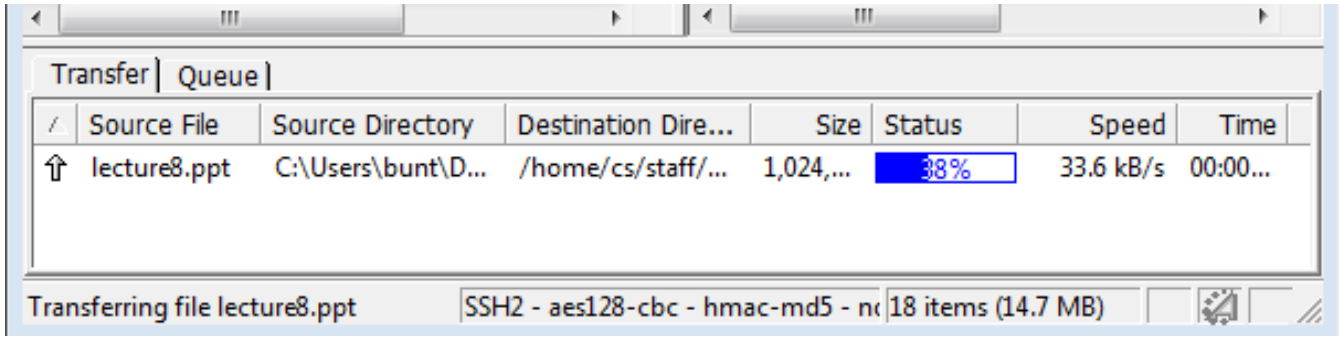
Design Principles: **Feedback**

Feedback during long delays:

- **Cursors**
  - For short transactions
- **Percent done dialogs**
  - For longer transactions
    - How much left
    - Estimated time
    - What it is doing…







Feedback: Long Delays

During the long system delays

- Other parts of the interface **should continue working (if possible)** as the long task completes
- Should be possible to pause/cancel long jobs
- How you design your code will impact your ability to do this at the interface level

But there is value with a ”fake progress bar”!

https://www.theatlantic.com/technology/archive/2017/02/why-some-apps-use-fake-progress-bars/517233/

http://www.cond.org/deception.pdf

Week 2 Goals Overview

- ~~**Monday**~~
  - ~~Interface and Interaction~~
- **Wednesday**
  - ~~Usability and UX~~
- **Friday**
  - ~~**Design Principles: Part 1**~~