Outline

- Background
- Script languages for GUIs
- GUI design do's & don'ts

GUI Design

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Why use a GUI?

GUI = Graphical User Inferface

• A well-designed GUI speeds learning

- Opens software to occasional users & novices
- · Scaleable: offers power tools to experts

Portable GUIs

Windows only?

Support for Linux & Mac offers wider range of users & growth into parallel processing

Portable GUI tools

- Compiled (usually C++) packages
 - FLTK (<u>www.fltk.org</u>)
 - wxWidgets [nee wxWindows] (<u>www.wxwidgets.org</u>)
- Virtual Machine
 Java
 - Java
- Script languages
 - Python + Tk, +wxWidgets, +GTK
 GUI Builders: wiki.python.org/moin/GuiProgramming
 - Tcl/Tk (<u>www.tcl.tk</u> & comp.lang.tcl)



Pros & cons of scripting

Pros

· Easy to code

Cons

- Slower than
- Test small routines
 Extensible when speed is needed
- compiled codeDebugging can be non-trivial
- Highly portable
- · Add code at run time

IMHO 1: GUIs do not need tremendous speed

 GUIs interact with people, who cannot tell the difference between a 10 μsec vs a 50 millisec screen paint

IMHO 2: Where possible don't incorporate code into script language, use external programs

- When more extensive computations are needed, one can pass information to an external program, run it & read back results
 - More portable
 - Easier to debug
 - More than fast enough: overhead of write, fork & read is usually trivial

Example: Calling an external program

- CMPR EditCell replaced SGI GL program MANDEX: animate powder diffraction line positions
- 1st draft: run FORTRAN program each time slider is moved
 - Fast enough
- Final version: modify FORTRAN output for direct parsing by interpreter
 - Even faster!

1st vs. 2nd gen. output

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11	0	0 1 2 1 17.7176 5.00000
11	0	<u>1 1 2 3 20 5424 2 12240</u>
11	1	set dgen1(x) {
11	1	17.7129707 22.191597 28.5358257 29.7368317
11	-1	34.8244629 35.8678513 37.4165802 41.6833496
11	0	42.5831184 45.2750664 47.2591591 48.9819603
11	1	}
11	-1	set dgen1(h) {
11	0	0 0 1 1 -1 0 1 -1 0 1 -1 0
11	1	}
11	-1	set dgen1(k) {
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11	1	, , , , , , , , , , , , , , , , , , , ,
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		set dgen1(1) {
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		}

Thoughts on GUI design

2nd Generation GUIs depend on a visual short-hand

Dummy Histogram

Select File Edit file

Select File

- Analogy to physical things - Push Buttons/Toggle buttons
 - Notebook tabs

Crysta

- Last operation in bottom corner - MS: Save/Cancel
 - Motif: Apply/Accept/Cancel
- · GUIs often follow visual conventions

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				- 51- (6)	a (1			TOF-mir 2-Theta
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- Geographic proximity helps connect GUI components
- Separators (boxes, lines) keep sets of items distinct

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	Select set
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Add New Set Data Limits & Set Histogram Histogram Excluded Regions Use Flags

Jsable data limit: 152

Other Design Goals

- · Screen space is valuable don't waste it
- A little bit of color helps guide the eye
- Too much color is confusing
 - Keep contrast levels high (have pity on the color blind)
- Try to use color consistently

Adding phase #1 Phase title:								
Space Group:	a 0	a c 90.	b β	90.	c y	90.		
Add Cancel Help	Import phase f	rom:	Crystallographic Information File (CIF) -					

GUI design: Hall of Fame & Shame

CIFEDIT: not simple but easy



Another of my "greatest hits" **EXPGUI**

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Multi-step processes are tough with GUIs













I don't know how to make this more intuitive



I don't know how to make this more intuitive



I don't know how to make this more intuitive



I don't know how to make this more intuitive



I don't know how to make this more intuitive

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Even worse



Even worse

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Conclusions

- Script languages are great for portable GUI design
- Intuitive GUIs take considerable thought
- · Use conventional designs where possible
- Multi-step procedures are tough to make intuitive
 - Tutorials help
- · Users really like GUIs