CS2704

Topic 5
A Simple GUI Toolkit

Outline
• Event driven programming
• A simplified GUI Toolkit
• Example programs

Event Driven Programming
• System is driven by reacting to events
  – Process waits for an event to occur
  – Receives notification of event
  – Decide how to react based on system state
  – React – update windows and system state
  – Wait for next event
• System state – variables/objects of system

Simplified GUI Toolkit
• Handles only mouse and timer events
• Use global objects to communicate state information
• Four functions respond to events
• Not strictly a proper OO design

Four functions
• OnStart – initialize global objects, variables and display
• OnPaint – redraw display
• OnTimerEvent – react to clock alarm
• OnMouseEvent – react to mouse click or move

File “Program.cc”
#include "Program.h"
//include necessary header files here
//define global objects or variables

void OnStart(void) {}
void OnMouseEvent(char *frameName, int x, int y, int buttonState) {}
void OnTimerEvent(void) {}
void OnPaint(void) {}
# Hello World Program

```cpp
#include "Frame.h"
Frame window("Hello World Program", 200, 200, 400, 400);
void OnStart(void) {
    window.Clear();
    window.DrawText("Hello World!", 20, 20);
}
```

```cpp
void OnMouseEvent(char *frameName, int x, int y, int buttonState) {}
void OnTimerEvent( void ) {} 
void OnPaint( void ) {
    window.Clear();
    window.DrawText("Hello World!", 20, 20);
}
```

## Program with Mouse Events (1)

```cpp
#include "Program.h"
#include "Frame.h"
Frame window("Hello World Program", 200, 200, 400, 400);
int lastx, lasty;
void OnStart( void ) {
    window.Clear();
    window.DrawText("Hello World!", 20,20);
    lastx = 20; lasty = 20;
}
void OnTimerEvent( void ) {} 
```

```cpp
void OnMouseEvent( char *frameName, int x, int y, int buttonState) {
    if (buttonState & leftButtonDown) {
        window.Clear();
        window.DrawText("Hello World!", x,y);
        lastx = x; lasty = y;
    }
}
```

## Program with Mouse Events (2)

```cpp
void OnPaint( void ) {
    window.Clear();
    window.DrawText("Hello World!", lastx, lasty);
}
```

## Mouse and Timer Events (1)

```cpp
#include "Program.h"
#include "Frame.h"
Frame window("Hello World Program", 200, 200, 400, 400);
int lastx, lasty, visible;
void OnStart( void ) {
    window.Clear();
    window.DrawText("Hello World!", 20,20);
    lastx = 20; lasty = 20;
    visible = 1;
}
void OnTimerEvent( void ) {} 
```

```cpp
void OnMouseEvent( char *frameName, int x, int y, int buttonState) {
    if (buttonState & leftButtonDown) {
        window.Clear();
        if (visible)  window.DrawText("Hello World!",x,y);
        lastx = x;    lasty = y;
    }
}
```

## Mouse and Timer Events (2)

```cpp
void OnPaint( void ) {
    window.Clear();
    if (visible) window.DrawText("Hello World!",x,y);
}
```

## Mouse and Timer Events (3)

```cpp
void OnTimerEvent( void ) {
    window.Clear();
    if (visible) visible = 0;
    else  {
        visible = 1;
        window.DrawText("Hello World!", lastx, lasty);
    }
}
```

```cpp
void OnPaint( void ) {
    window.Clear();
    if (visible) window.DrawText("Hello World!", lastx, lasty);
}
```