

SWE4001 – System Programming
Module 7: Editors and Debugging system
Lesson 3 of 5: Interactive debugging
systems

Outline

- ❖ Text Editors
- ❖ Overview of Editing process
- ❖ User interface
- ❖ Editor Structure
- ❖ Interactive Debugging systems
- ❖ Debugging functions and capabilities
- ❖ Relationships with Other parts of the system
- ❖ User Interface Criteria

Interactive debugging systems

- ❖ It provides programmers with facilities that aid in the testing and debugging of programs.
- ❖ Unit test – it deals with the execution sequencing, which is the observation and control of the flow of program execution
- ❖ Breakpoints – which cause execution to suspended when a specified point in the program is reached
- ❖ Programmers can define conditional expressions that are continually evaluated during the debugging session

Tracing

- ❖ It can be used to track the flow of execution logic and data modifications
- ❖ The control flow can be traced at different levels of detail, procedure, branch, individual instruction
- ❖ It can also be based on conditional instruction

Trace back

- ❖ It show the path which statements have modified a given variable or parameter
- ❖ It should be displayed symbolically and should be related to the source program

Program display

- ❖ It must be possible to display the program being debugged, complete with statement numbers
- ❖ The user should be able to control the level at which this display occurs

Context

- ❖ When the debugger receives control, the execution of the program being debugged is temporarily suspended.
- ❖ The debugger must then be able to determine the language in which the program is written and set its context accordingly.
- ❖ The debugger should be able to switch its context when a program written in one language calls a program written in a different language.

Example - Context

❖ Assignment statements

- COBOL
 - MOVE 3.5 TO A
- FORTRAN
 - A = 3.5

❖ Conditional expression

- COBOL
 - IF A NOT EQUAL TO B
- FORTRAN
 - IF (A .NE. B)

Display of source code

❖ Two main options:

- The language translator may provide the source code or source listing tagged in some standard way so that the debugger has a uniform method of navigating about it.
- The translator may supply an interface module that does the navigation and display in response to requests from the debugger.

❖ Debugging system be able to deal with optimized code.

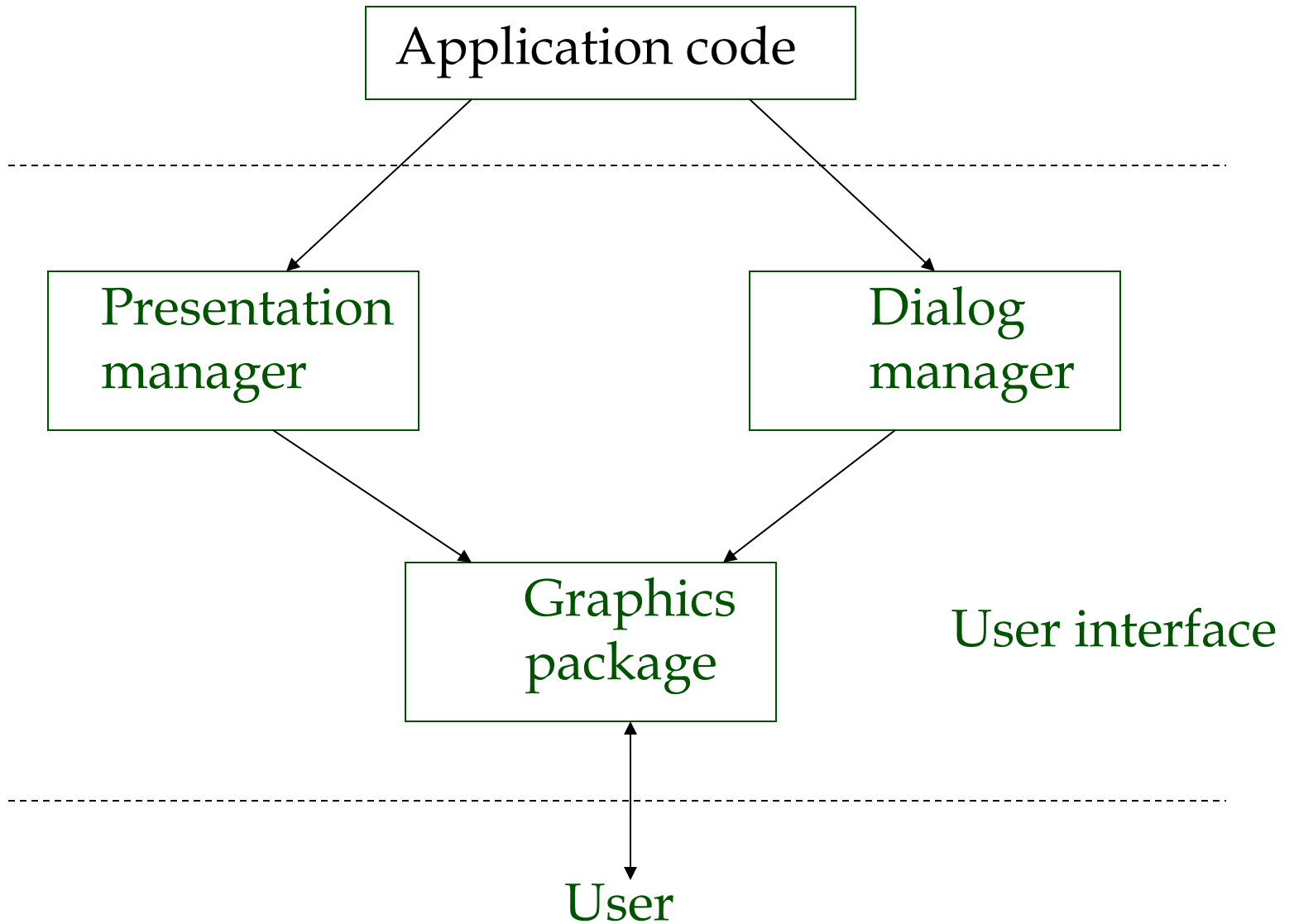
- Invariant expressions can be removed from loops.
- Separate loops can be combined into a single loop
- Redundant expressions may be eliminated

Relationship with other parts of the system

- ❖ It always be available, it means that it must appear to be a part of the run time environment and an integral part of the system.
- ❖ It must not be possible to use the debugger to interfere with any aspect of system integrity
- ❖ The debugger must co-ordinate its activities with those of existing and future language compilers and interpreters

User interface criteria

- ❖ The UI functionalities have two important aspects
 - Issuing of commands
 - Exchange of data
- ❖ The user interface consists of two components:
 - Dialog manager
 - Presentation manager



Components of user interface

- ❖ The dialog manager manages the conversation between the user and application. It involves prompting the user for a command and transmitting it to the application
- ❖ The presentation manager displays the data produced by the application in an appropriate manner on the user's display or printer device

Command dialogs

- ❖ **Command languages** for computer applications are similar to command languages for operating system
- ❖ **Command menus** provide obvious advantages to the casual user of an application, as the basic functionalities of the application are reflected in the menu choices
- ❖ **Direct manipulation system** provides the user with a visual display of the universe of the application.

Pro of command dialog design

- ❖ Ease of use
- ❖ Error handling
- ❖ Undo facility
- ❖ Shortcuts for experienced users
- ❖ Immediate feedback on user commands

Online help

- ❖ List of available commands can provide valuable assistance for the inexperienced or occasional user.
- ❖ Online help can be organized in the form of online explanations, demonstrations, tutorials or online manuals concerning commands

Hyper text

- ❖ It consist of hierarchical arrangement of information units and provides a variety of means to locate the required information
- ❖ In the form of:
 - Tables and indexes
 - String searching functions
 - Means to navigate with in the document
 - Back tracking facilities