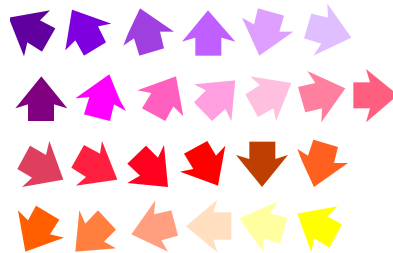# XXV. Interface Objects

Three-Tier Architectures
The Presentation layer
Sequence Diagrams for User Interface Classes
Prototyping the User Interface
User Interface Class and Package Diagrams
Model-View-Controller Architecture Revisited
**Statechart Diagrams for Dialogue Dynamics**

The Three-Tier Architecture Revisited

- User interfaces for an information system are part of the presentation layer in the three-tier architecture.
- The three-tier architecture separates cleanly user interfaces from application logic/business classes and from data storage components of the system.
- Business classes "know nothing" of how their (business) objects will be presented to the users.
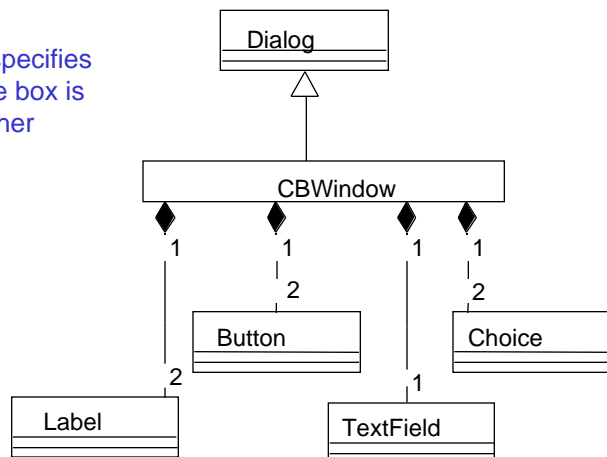
Ex: Check Campaign Budget
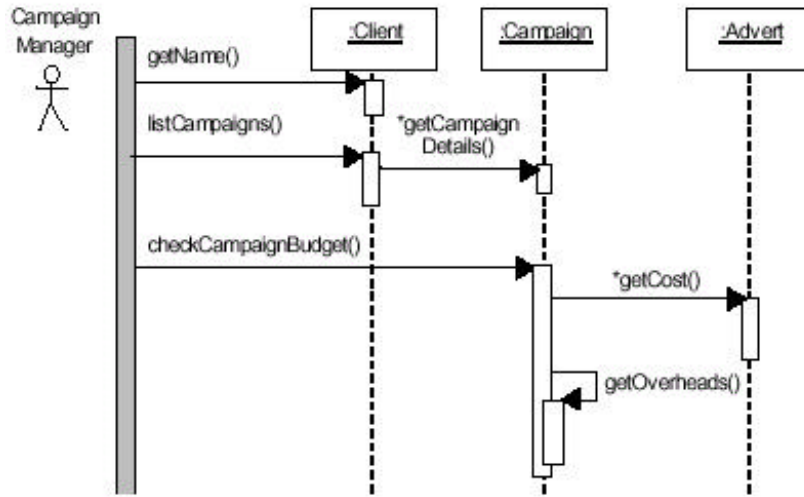
Add a Dialog Box Object

2
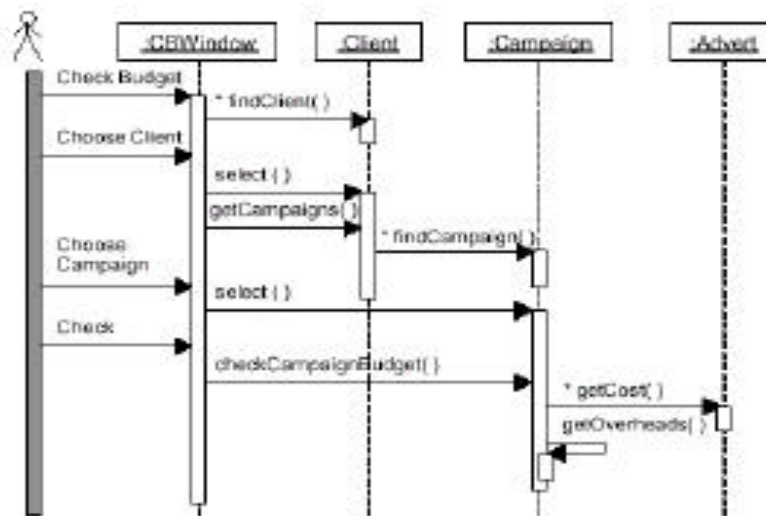
Prototyping the Dialogue

- Prototyping can be used to determine what the interface will look like.
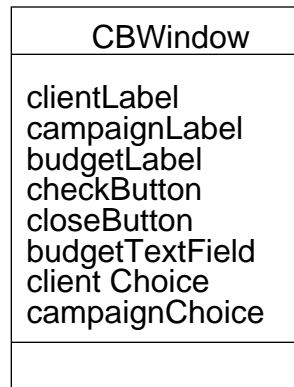

Class Diagram for Interface Classes

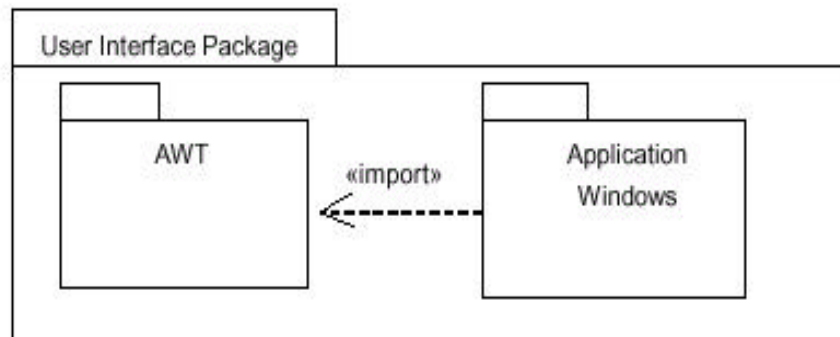- Composition specifies that a dialogue box is made up of other components

3

Another Class Diagram

- This can also be represented as a class with the graphical components that make it up as attributes.
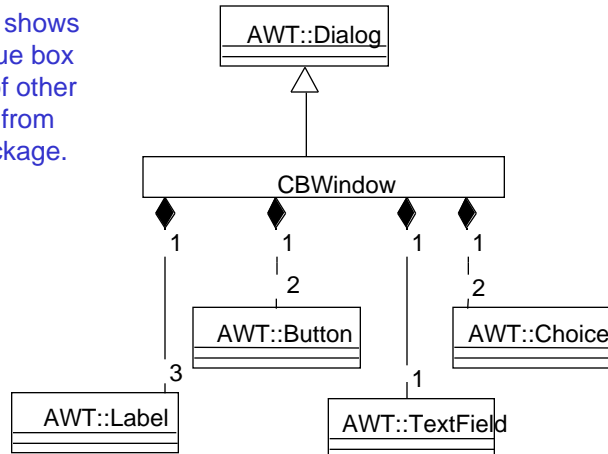
CBWindow
clientLabel campaignLabel budgetLabel checkButton closeButton budgetTextField client Choice campaignChoice

---

Packages for Interface Classes

- Package diagram shows the dependencies between interface classes in different packages.

User Interface Package

AWT   «import»   Application Windows

4

Revised Class Diagram

■ Composition shows that a dialogue box is made up of other components from the AWT package.
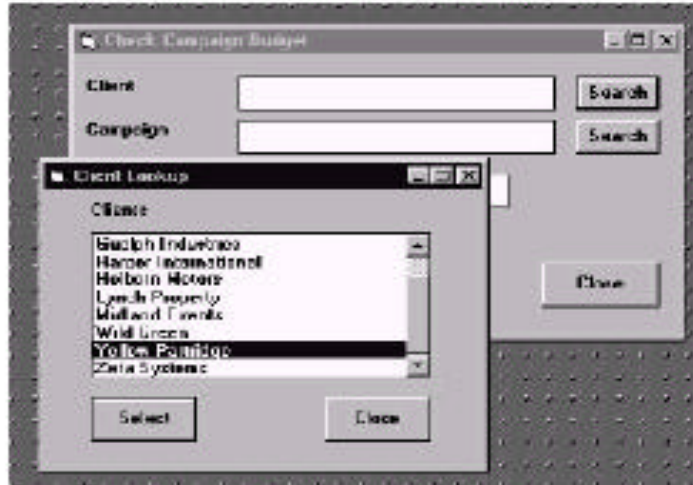
Prototyping the Dialogue

■ There are several ways for entering the Client and Campaign name:

   ✓ Use a separate look-up window for each class;

   ✓ Allow the user to enter a part of a name, then have the system return a list of close matches;

   ✓ Use a tree data structure to show clients and campaigns in a tree-like hierarchy.

Alternative Dialogue Prototypes

- Separate window for look-up

Alternative Dialogue Prototypes: Three View Control

6

Updating the Sequence Diagram

- Choice:
Client (CL)
Campaign (CA)
Lookup
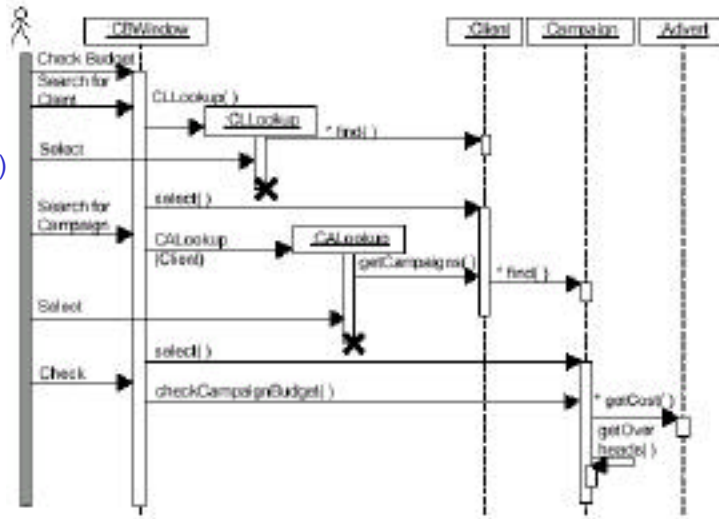
Updating the Class Diagram

7

Model-View-Controller

4: Update Presentation

User Event   :Controller   :View

6: Notify Change   1: Broadcast

7: Request Model data

2: Update self   :Model   5: Ask What Has Changed

3: Notify Change
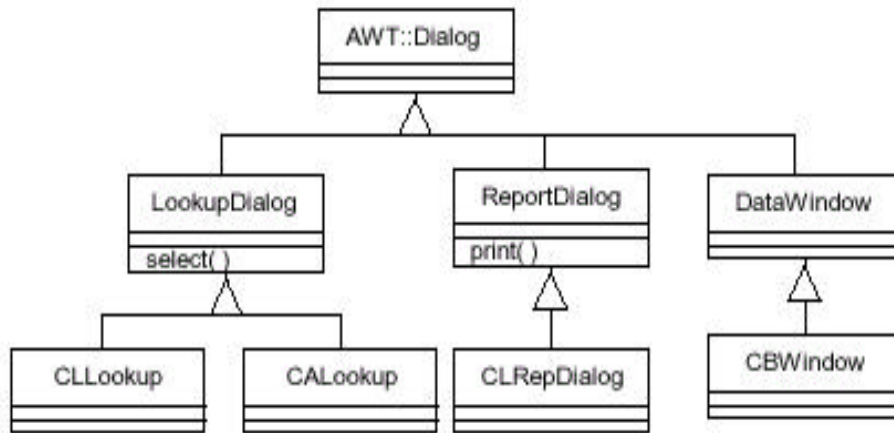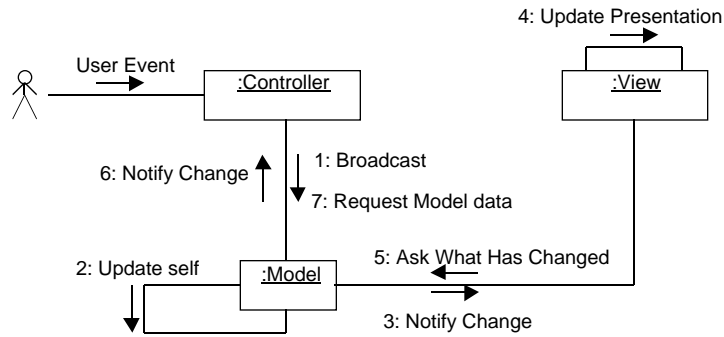
The ActionListener Approach

4: Update Self

User Event   :Component   any:Class

1: ActionPerformed
(ActionEvent e)

3: [Event of Interest]
Notify Class of Event

2: Inspect Event   :ActionListener

8
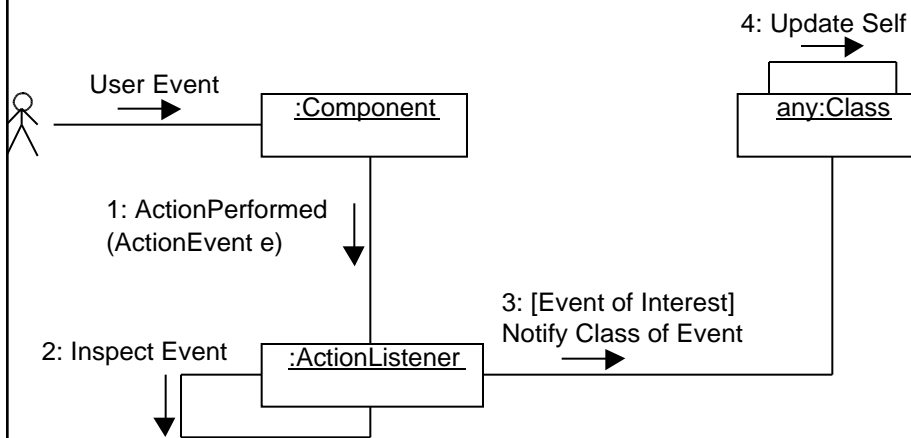
Modelling the Dynamic Behaviour
of the Interface

- The sequence diagrams show the sequential view of the user working through the fields on the screen from top to bottom.
- But in GUI interfaces the user can click on the interface object out of sequence.
- What happens if the user clicks on the Check button before a client and a campaign have been selected?
- To specify what happens, we can use Statechart diagrams!

Client listbox, Campaign Listbox, Cursor

9
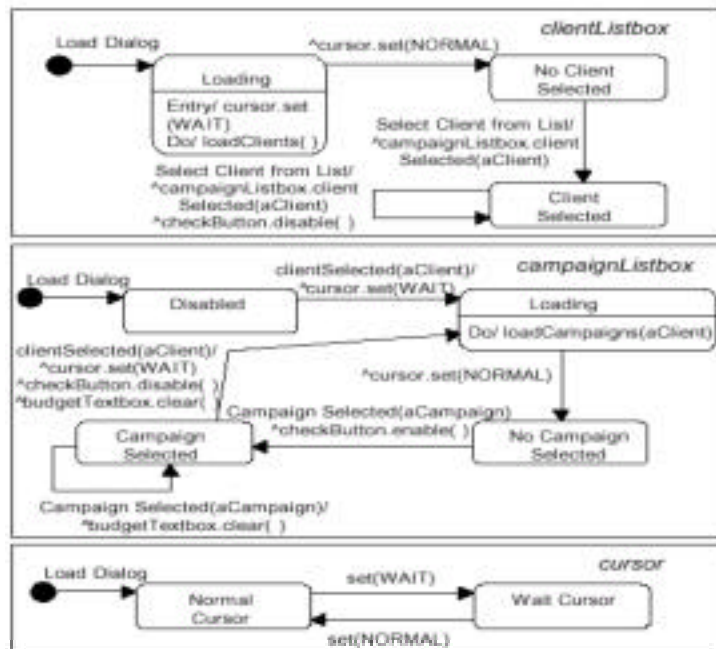
CheckButton, BudgetTextbox
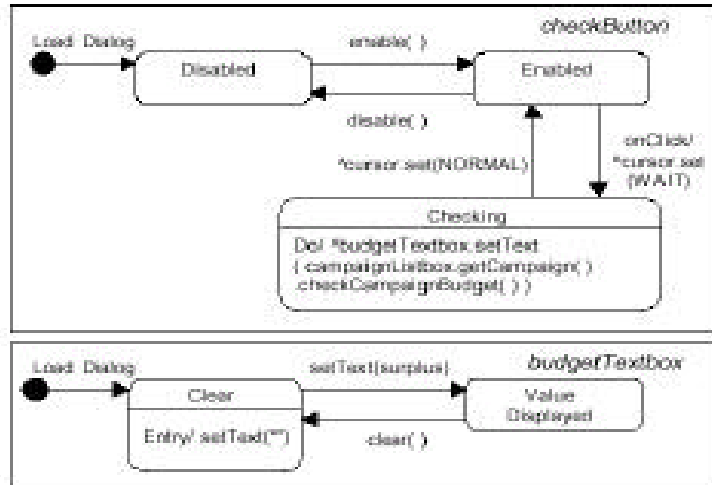
Additional Readings

- Bennett S, Farmer R and McRobb S (1999) *Object-Oriented Systems Analysis and Design Using UML*. McGraw-Hill. Chapter 16 - Designing interface objects.
- Larman C (1998) *Applying UML and Patterns*. Prentice-Hall. Chapter 22 - Issues in System Design.