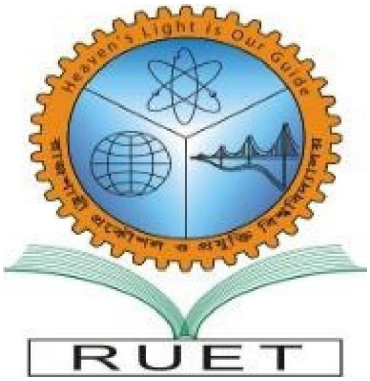
"HEAVENS LIGHT IS OUR GUIDE"

RAJSHAHI UNIVERSITY OF ENGINEERING & TECHNOLOGY



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE Code: CSE 3206

COURSE TITLE: Software Engineering Sessional

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Problem: Command
Solution:

```
// concrete commands.
abstract class Command is
    protected field app: Application
    protected field editor: Editor
    protected field backup: text

    constructor Command(app: Application, editor: Editor) is
        this.app = app
        this.editor = editor

    // Make a backup of the editor's state.
    method saveBackup() is
        backup = editor.text

    // Restore the editor's state.
    method undo() is
        editor.text = backup

    // The execution method is declared abstract to force all
    // concrete commands to provide their own implementations.
    // The method must return true or false depending on whether
    // the command changes the editor's state.
    abstract method execute()


// The concrete commands go here.
class CopyCommand extends Command is
    // The copy command isn't saved to the history since it
    // doesn't change the editor's state.
```

```
    method execute() is
        app.clipboard = editor.getSelection()
        return false

class CutCommand extends Command is
    // The cut command does change the editor's state, therefore
    // it must be saved to the history. And it'll be saved as
    // long as the method returns true.
    method execute() is
        saveBackup()
        app.clipboard = editor.getSelection()
        editor.deleteSelection()
        return true

class PasteCommand extends Command is
    method execute() is
        saveBackup()
        editor.replaceSelection(app.clipboard)
        return true

// The undo operation is also a command.
class UndoCommand extends Command is
    method execute() is
        app.undo()
        return false


// The global command history is just a stack.
class CommandHistory is
    private field history: array of Command

    // Last in...
```

```
    method push(c: Command) is
        // Push the command to the end of the history array.

    // ...first out
    method pop():Command is
        // Get the most recent command from the history.


// The editor class has actual text editing operations. It plays
// the role of a receiver: all commands end up delegating
// execution to the editor's methods.
class Editor is
    field text: string

    method getSelection() is
        // Return selected text.

    method deleteSelection() is
        // Delete selected text.

    method replaceSelection(text) is
        // Insert the clipboard's contents at the current
        // position.


// The application class sets up object relations. It acts as a
// sender: when something needs to be done, it creates a command
// object and executes it.
class Application is
    field clipboard: string
    field editors: array of Editors
    field activeEditor: Editor
```

```
    field history: CommandHistory

    // The code which assigns commands to UI objects may look
    // like this.
    method createUI() is
        // ...
        copy = function() { executeCommand(
            new CopyCommand(this, activeEditor)) }
        copyButton.setCommand(copy)
        shortcuts.onKeyPress("Ctrl+C", copy)

        cut = function() { executeCommand(
            new CutCommand(this, activeEditor)) }
        cutButton.setCommand(cut)
        shortcuts.onKeyPress("Ctrl+X", cut)

        paste = function() { executeCommand(
            new PasteCommand(this, activeEditor)) }
        pasteButton.setCommand(paste)
        shortcuts.onKeyPress("Ctrl+V", paste)

        undo = function() { executeCommand(
            new UndoCommand(this, activeEditor)) }
        undoButton.setCommand(undo)
        shortcuts.onKeyPress("Ctrl+Z", undo)

    // Execute a command and check whether it has to be added to
    // the history.
    method executeCommand(command) is
        if (command.execute())
            history.push(command)
```

```
    // Take the most recent command from the history and run its
    // undo method. Note that we don't know the class of that
    // command. But we don't have to, since the command knows
    // how to undo its own action.
    method undo() is
        command = history.pop()
        if (command != null)
            command.undo()
```

Problem: Iterator
Solution:

```
// producing iterators. You can declare several methods if there
// are different kinds of iteration available in your program.
interface SocialNetwork is
    method createFriendsIterator(profileId):ProfileIterator
    method createCoworkersIterator(profileId):ProfileIterator



// Each concrete collection is coupled to a set of concrete
// iterator classes it returns. But the client isn't, since the
// signature of these methods returns iterator interfaces.
class Facebook implements SocialNetwork is
    // ... The bulk of the collection's code should go here ...

    // Iterator creation code.
    method createFriendsIterator(profileId) is
        return new FacebookIterator(this, profileId, "friends")
    method createCoworkersIterator(profileId) is
        return new FacebookIterator(this, profileId, "coworkers")



// The common interface for all iterators.
```

```
interface ProfileIterator is
    method getNext():Profile
    method hasMore():bool



// The concrete iterator class.
class FacebookIterator implements ProfileIterator is
    // The iterator needs a reference to the collection that it
    // traverses.
    private field facebook: Facebook
    private field profileId, type: string

    // An iterator object traverses the collection independently
    // from other iterators. Therefore it has to store the
    // iteration state.
    private field currentPosition
    private field cache: array of Profile

    constructor FacebookIterator(facebook, profileId, type) is
        this.facebook = facebook
        this.profileId = profileId
        this.type = type

    private method lazyInit() is
        if (cache == null)
            cache = facebook.socialGraphRequest(profileId, type)

    // Each concrete iterator class has its own implementation
    // of the common iterator interface.
    method getNext() is
        if (hasMore())
            result = cache[currentPosition]
```

```
            currentPosition++
            return result

    method hasMore() is
        lazyInit()
        return currentPosition < cache.length



// Here is another useful trick: you can pass an iterator to a
// client class instead of giving it access to a whole
// collection. This way, you don't expose the collection to the
// client.
//
// And there's another benefit: you can change the way the
// client works with the collection at runtime by passing it a
// different iterator. This is possible because the client code
// isn't coupled to concrete iterator classes.
class SocialSpammer is
    method send(iterator: ProfileIterator, message: string) is
        while (iterator.hasMore())
            profile = iterator.getNext()
            System.sendEmail(profile.getEmail(), message)



// The application class configures collections and iterators
// and then passes them to the client code.
class Application is
    field network: SocialNetwork
    field spammer: SocialSpammer

    method config() is
        if working with Facebook
```

```
            this.network = new Facebook()
        if working with LinkedIn
            this.network = new LinkedIn()
        this.spammer = new SocialSpammer()

    method sendSpamToFriends(profile) is
        iterator = network.createFriendsIterator(profile.getId())
        spammer.send(iterator, "Very important message")

    method sendSpamToCoworkers(profile) is
        iterator = network.createCoworkersIterator(profile.getId())
        spammer.send(iterator, "Very important message")
```