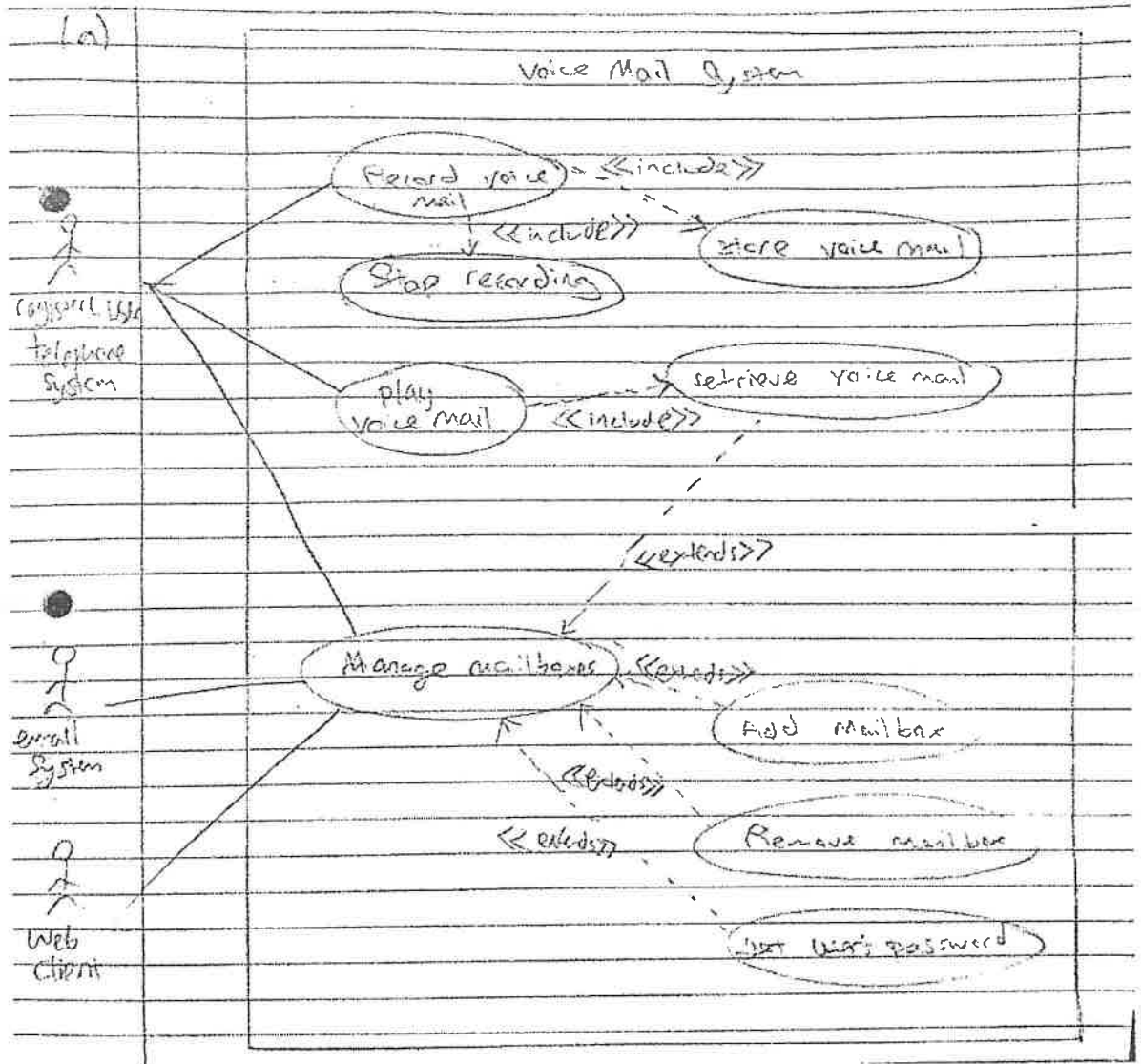


Solver: Shao Jie

Email Address: yews0012@e.ntu.edu.sg

1. (a)

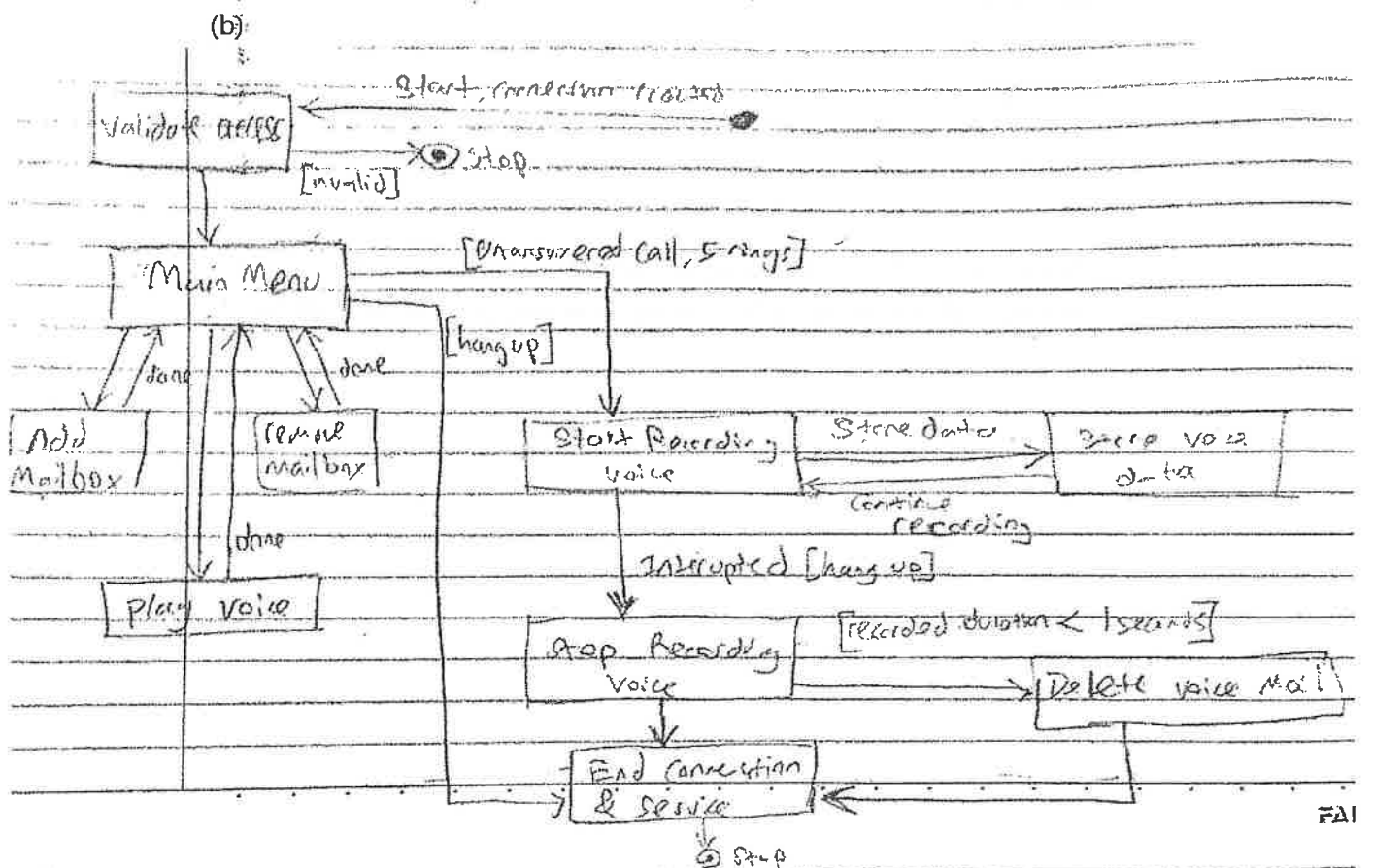
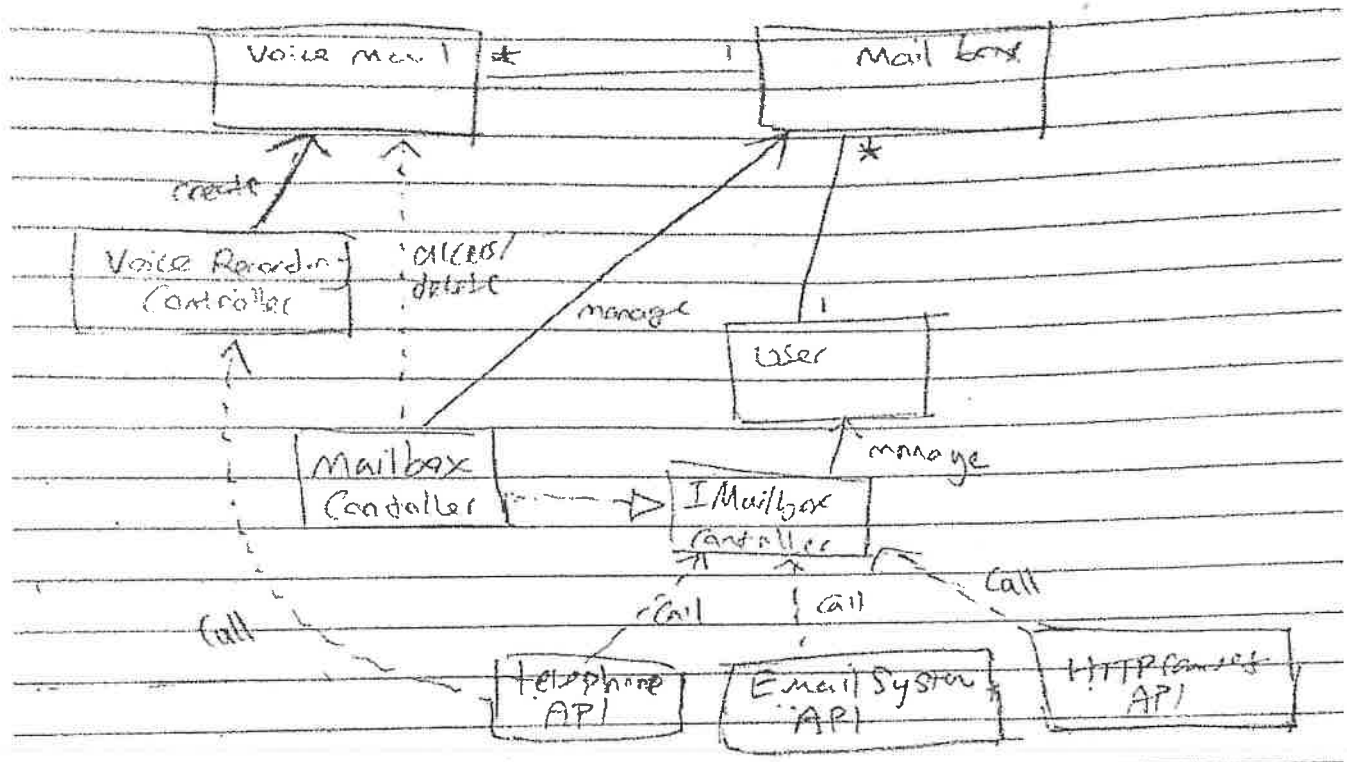


CSEC 17th - Past Year Paper Solution 2016-2017 Sem2
CE/CZ2006 – SOFTWARE ENGINEERING

(b)

NAME	Record Voice Mail
DESCRIPTION	Registered user via made a call Telephone System and it goes unanswered for 5 rings. The voice mail system gets activated. Telephone System creates a connection with Voice Mail system and starts recording and storing the voice in the Voice Mail system. When Registered user hand up the Telephone System, stop recording request is sent to the Voice Mail system to stop the voice recording.
ACTORS	Telephone System (interface with the Voice Mail system)
PRECONDITIONS	Registered user's call went unanswered for 5 rings on the Telephone System.
POSTCONDITIONS	<ol style="list-style-type: none"> 1. Voice mail is stored on the Voice Mail System. 2. No voice mail is stored.
MAIN	<ol style="list-style-type: none"> 1. Telephone System request connection to Voice Mail system 2. The Telephone System stream the voice to Voice Mail 3. The Voice Mail system records and store the voice using 'Store Voice Mail usecase' as it is recording. 4. The Telephone System hang up 5. The Voice Mail system interrupt the recording using 'Stop Recording usecase'
ALTERNATIVE	<p>4a) If Telephone System hang up within 1 second.</p> <ol style="list-style-type: none"> 1. The Voice Mail system delete the recorded voice as it is considered cancelled. 2. No voice mail is stored. 3. The use case resumes at 5

2. (a)



(c)

Project duration estimation methods

1. Use Historical Data

Involves comparing experience with other similar projects developed within or outside the organisation/company

2. Use Expert Judgement

Involves getting experienced programmers or software project managers to provide estimates.

3. Wideband Delphi

- (1) Each team members to makes an estimate.
- (2) Team discusses the reasons for each estimate.
- (3) Each team member revises their estimate.
- (4) Team discusses the reasons for each estimate.
- (5) Repeat (3) and (4) until there is acceptable agreement.

4. Story Point

Involves making the development of a particular task into a set of stories with story points and the amount difficulty or effort (not time) needed for each story (say on a scale of 1 to 10 where 10 is the hardest). If the team can agree the relative difficulties of each story some estimate of the resources required to develop each story can be made.

PERT Chart

A PERT chart is a project management tool used to schedule, organize, and coordinate tasks within a project.

Critical Path analysis

It allow us to determine the critical path, noncritical path and slack time.

Critical path:

A sequence of activities that take the longest time to complete

The length of the critical path(s) defines how long your project will take to complete.

Noncritical path:

A sequence of activities that you can delay and still finish the project in the shortest time possible.

Slack time:

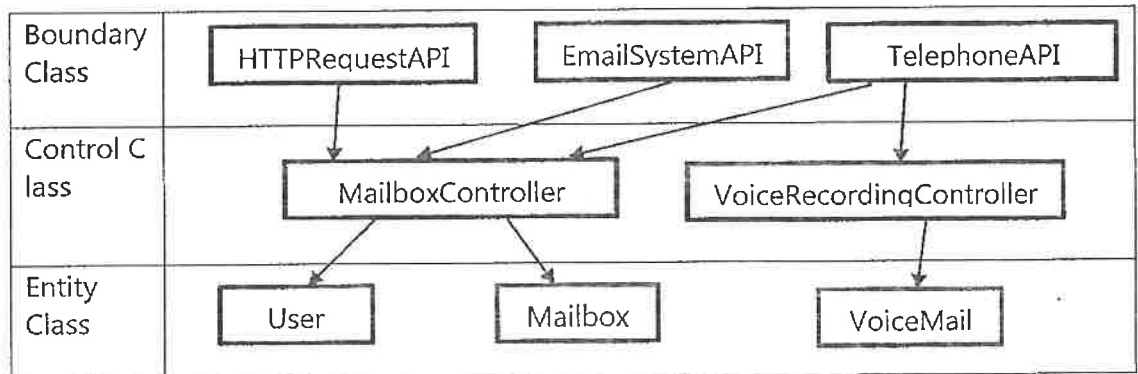
The maximum amount of time that you can delay an activity and still finish your project in the shortest time possible.

3. (a)

(i)

Boundary Class	TelephoneAPI, EmailSystemAPI, HTTPRequestAPI
Control C lass	VoiceRecordingController, MailboxController,
Entity Class	VoiceMail, Mailbox, User

(ii)



(iii)

Strength

- System is broken up into a number of layers. Typically three.
Boundary (Presentation), Control (Business), Entity (Data) layers.
- Help partition complex problems - **Easy maintenance** for each layer
- **Low coupling**: each layer is (in principle) permitted to interact only with layer immediately under using interface between layers
 - **Easily enhanced** - the layers can be enhanced without **touching the other layers**.
 - **Easily scaled** – can add new databases, increase control or change the interface without affecting other layers

Weaknesses

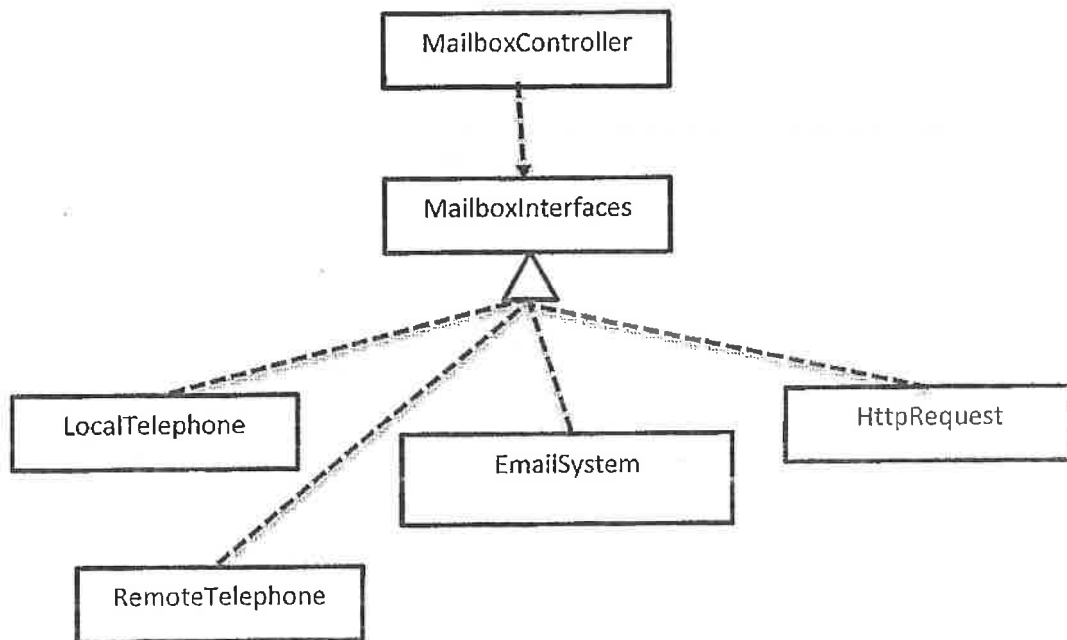
Performance overhead from going through layers

(b)

(i) The system does not need to know the way user access and administer their mail box. Different way of method must be able to access and administer the same mail box. A set of algorithms or objects should be interchangeable. Context has the ability to select different algorithms at runtime. **Decouple the context** from the different strategy using an abstract interface. Group the similar algorithms by implementing an abstract class to make them interchangeable. Strategy pattern lets the algorithm interchangeable from clients that use it.

(ii) Strategy Pattern

(iii)



MailboxInterfaces is an abstract class that provide common interface for context to use, which the concrete strategy must follow.

LocalTelephone, **RemoteTelephone**, **EmailSystem**, **HttpRequest** are concrete strategy that allow context to interchange among.

4: (a)

(i)

Equivalence Class	Value
Valid	$100 \leq \text{Value} \leq 699$
Invalid	$\text{Value} < 100, \text{Value} > 699$

(ii)

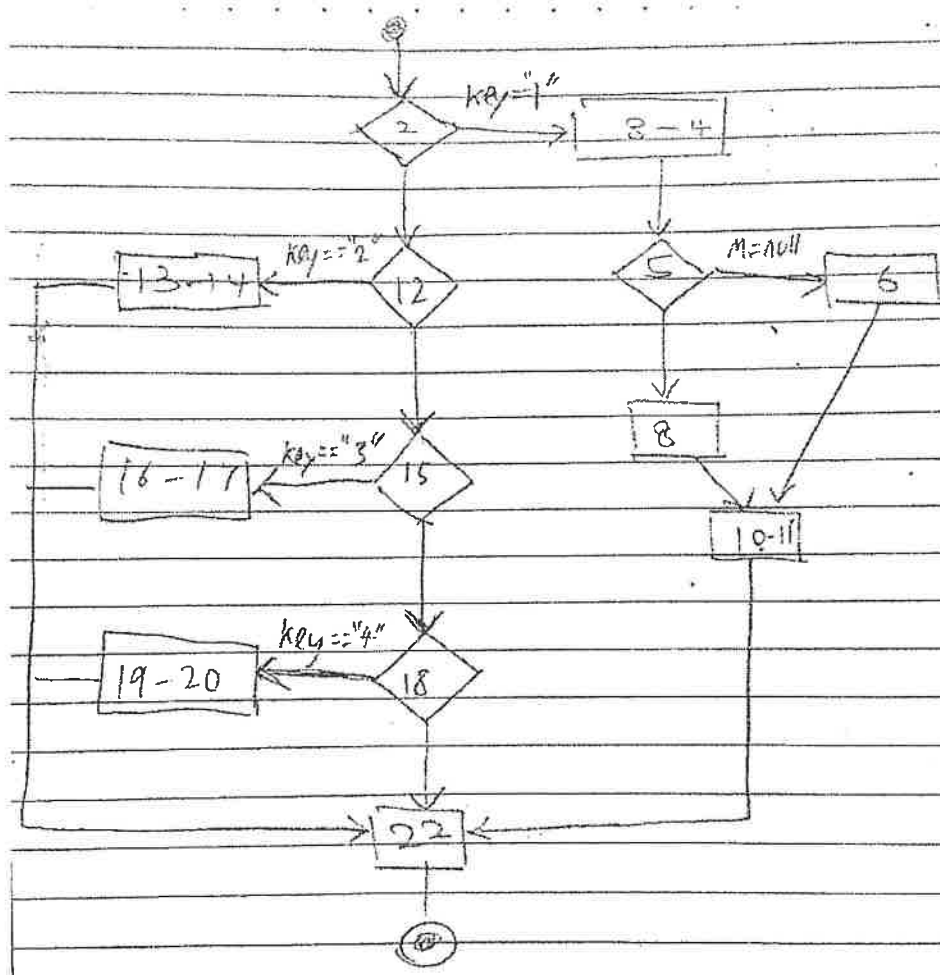
Range	Boundary Value
$100 \leq \text{Value} \leq 699$	100, 699
$\text{Value} < 100, \text{Value} > 699$	99, 700

(iii)

Test Value	Expected Result
100	Valid
699	Valid
99	Invalid
700	Invalid

(b)

(i)



(ii) Cyclomatic Complexity: 6

$$CC = |\text{decisionpoint}| + 1$$

(if all decision points are binary)

CSEC 17th - Past Year Paper Solution 2016-2017 Sem2
CE/CZ2006 – SOFTWARE ENGINEERING

(iii)

Input	Mailbox	Path	Expected Result
"1",	No mail in mailbox	2,3-4,5,6,10-11,22	Speak "No messages."
"1"	Messages exist in mailbox; "Hello World"	2,3-4,5,8,10-11,22	Speak "Hello World"
"2"		2,12,13-14,22	Save current message and speak messageMenu
"3"		2,12,15,16-17,22	Delete current message speak messageMenu
"4"		2,12,15,18,19-20,22	speak mailboxMenu
"5"		2,12,15,18,22	Nothing happens