YIJC JC2 H2 Computing Prelim P2 (Solutions)

1 (a) (i) [2]

Ensures that project is well defined, along with the requirements and checkpoints of the project.
Provides identification and arrangements of possible risks of the project.
It also describes the planning, management, execution and control of the project.

(ii)

[2]

- Aim of the project
- Project Summary
- Budget
- Project Management (the process of achieving the project solution represented in timelines and different milestones
- Scope Of Project and work needed to complete the project

(b) [4]

(Interview or examine documentations) Representatives from government agencies: The data sharing policy between them, individual agencies' needs for data, find out their current practice for data storing/sharing

(Interview) Associates from the PDPA office: to find out the regulations associated with data restrictions.

Survey citizens, residents: quantitative data with regards to perception on data collection by government agencies/possible concerns associated with the system, preferences on UI features.

(c) [4]

Social:

- loss of inclusivity for citizens who have difficulties using online services, e.g. elderly, underprivileged who may not be able to afford computers, etc.
- transition of government services to online/digital platforms may cause customer service officers/front desk workers to lose their jobs

Ethical:

- Storing of sensitive information in a common database. Misuse of access rights (i.e. agencies/staff having access to data when they are not permitted)
- Misuse of data (e.g. selling/sharing to third party, targeted advertisement, saving the data)

(d) (i)

Dashed lines on a PERT Chart indicate a **dummy activity.** [1]
Dummy activities are imaginary activities without any time duration to **demonstrate relationships/dependencies between activities [1]** that would otherwise be difficult to show with simple arrow linkages.

(ii) BEGHI [1]
(iii) 19 weeks [1]

(e)(i)

[4]

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A - Design of database																				
B - Design of web interface																				
C - Transfer file to database																				
D - Initial testing																				
E - Development																				
F - Documentation																				
G - Alpha testing																				
H - Acceptance testing																				
I - Implementation																				

(ii) A Gantt chart **shows the deadline of commencement and completion (duration)** of the various tasks presented on a timeline which enables clear communication to the team on the duration given for each activity. It also shows the **dependency of activities/concurrent activities (overlapping regions),** so as to allocate manpower and resources more efficiently. [2]

(f)(i) [4]

Consent given	T	T	T	T	F	F	F	F
Not special case	T	T	F	F	T	T	F	F
Basic services	T	F	T	F	T	F	T	F
Immediate release	X							
Approval needed		X	X	X				
Transaction Denied					X	X	X	X

(ii) [2]

Consent given	T	T	T	F
Not special case	T	T	F	-
Basic services	T	F	-	-
Immediate release	X			
Approval needed		X	X	
Transaction Denied				X

(g)(i)

- Encryption of data when sending/transmitting across the network (e.g. using HTTPS, secure shell protocol) to fend against man-in-the-middle attacks
- Firewall to filter malicious data packets which could compromise the database in an SQL injection attack

(ii) [2]

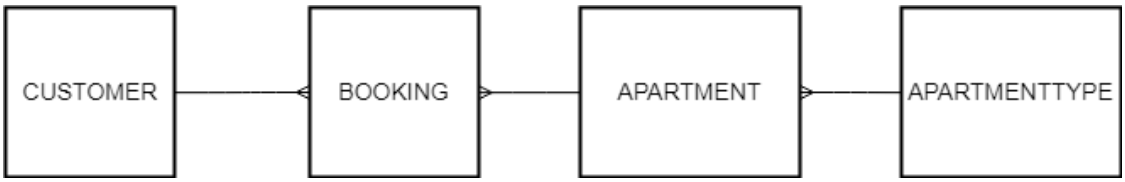
Different websites may have privacy policy that is more liberal. Protect/safeguard their own personal data from misuse.

(h) [6]

Adaptive maintenance can be carried out where maintenance to adapt to changes in requirements/environments such as improvements in technology or change in needs of the govt/agencies.
e.g. building in interfaces to allow for mobile use

Perfective maintenance can be carried out which will be centred on improvements for refinement and efficiency. The system can be improved to show a better optimising performance for a larger input.
e.g. reducing the time to perform query

2 **(a)**



CUSTOMER (CustomerID, Name, Email)
BOOKING (CustomerID*, ApartmentID*, BookingDate, CheckinDate, CheckoutDate, DepositPaid)
APARTMENT (ApartmentID, ApartmentType)
APARTMENTTYPE (ApartmentType, Rentalrate)

(b)

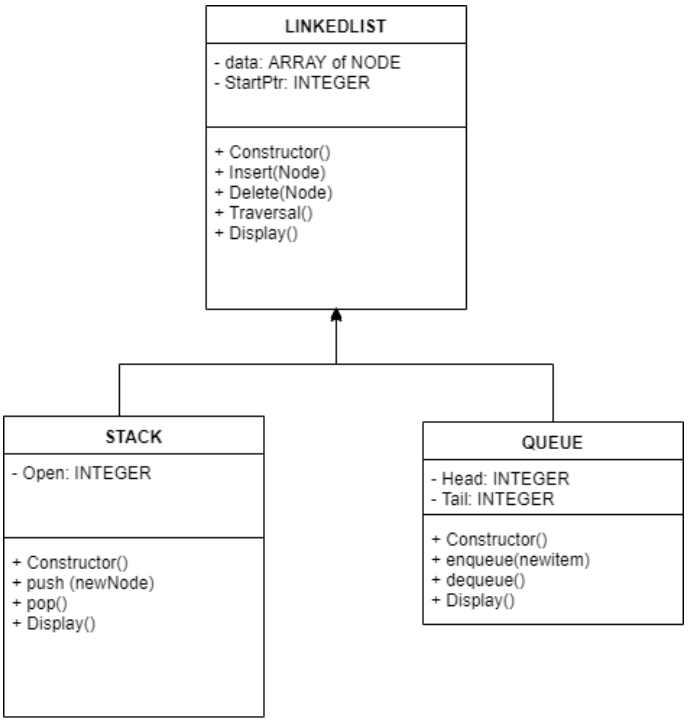
[3]

1. For date field, check that the check-in and check-out dates are at least one day apart, i.e. check-out date must be after check-in date
2. Email address should follow a standard format: ___@___.com
3. Name does not contain special characters/numbers

3 **(a)** [2]

An object is an instance of a class. It shares common attributes and methods with objects of the same class.

(b)



(ii)

- allows for code reusability (e.g. subclass defined from the parent class)
- robustness of code

Suggested Solutions:

4(a)

- Can access from anywhere (geographical location) and anytime (time zone).
- Allow for collaboration among the users

4(b): Either one of the following or any other reasonable answer:

[1] description of a threat applied to the university

[1] the effect on the university

[1] describe how the university could protect against the identified threat

[1] identify a limitation of the protection

Example 1 : Malware can be introduced eg worm, virus …

Software that deliberately causes harm to the data or applications held on the servers

Can be prevented by a firewall that monitors and controls network traffic based on rules set by the university or network administrator

Firewall can be bypassed by the use of a VPN tool to log on

Example 2 : Denial of service attacks that flood the servers with requests so that the system becomes overloaded and the servers can no longer be available to the university students and staff

Intrusion detection systems (IDS) monitor suspicious network activity

IDS provide alarms in time for network administrator to take further protective actions

IDS can provid many false alarms

4(c) Any two of the following:

- Unauthorised breaking in to the laptops; Password protection
- Virus attack; Use and regularly update the antivirus software
- Hardware failure; Keep backup copy of the data

4(d) Benefits:

- 4(d) IaaS; need not maintain their own hardware and infrastructure, scalability, regular updates, backup
- SaaS; greater sharing and collaboration among students
- PaaS; can provide and support application/software development platforms

Risks: Any two of the following:

- Unauthorised access to the data
- Availability, downtime
- Service provider reliability

5(a)(i) Refer to the table attached.

5(a)(ii) Order of Growth : $O(n^2)$ since there is a nested for loop within a for loop.

5(a)(iii) It is stable since the relative positions of the same value elements remains the same after the sorting.

5(b)(i)

INSERTION SORT

```
FOR k <- 2 TO ArraySize
    Key <- Array[k]
    j <- k
    WHILE (j > 0) AND (Array[j - 1] >
Array[j])
        Temp <- Array[j]
        Array[j] <- Array[j-1]
        Array[j-1] <- Temp
        j = j - 1
    ENDWHILE
ENDFOR k
OUTPUT "The sorted array is ", Array
```

5(b)(ii)

```
[12, 11, 13, 5, 6]
[11, 12, 13, 5, 6]
[11, 12, 5, 13, 6]
[11, 5, 12, 13, 6]
[5, 11, 12, 13, 6]
[5, 11, 12, 6, 13]
[5, 11, 6, 12, 13]
[5, 6, 11, 12, 13]
```

6 Singapore celebrated her 54th National Day this year and the greeting "**Happy 54th Birthday**" was transmitted very frequently through digital messages and information on webpages. They are transmitted as 0's and 1's in the digital world of binary codes.

Copy **only the rows with empty cells** and fill in the correct values. [5]

Character	ASCII Code	Binary	Hexadecimal
H	072	01001000	48
a	097	01100001	61
p	112	01110000	70
p	112	01110000	70
y	121	01111001	79
<space>	032	00100000	20
5	053	00110101	35
4	052	00110100	34
t	116	01110100	74
h	104	01101000	68
<space>	032	00100000	20
B	066	01000010	42
i	105	01101001	69
r	114	01110010	72
t	116	01110100	74
h	104	01101000	68
d	100	01100100	64
a	097	01100001	61
y	121	01111001	79

~ END OF PAPER ~

Trace Table for 1 (a) (i) :

k	MinIndex	j	Array [MinIndex]	Array[j]	Array[MinIndex] > Array[j]	Temp	Array				
							[1]	[2]	[3]	[4]	[5]
							5	**2**	**3**	**1**	**3**
1	1	2	5	2	TRUE		5	2	3	1	3
	2	3	2	3	FALSE						
		4	2	1	TRUE						
	4		1		FALSE	5	1			5	
2	2	3	2	3	FALSE						
		4	2	5	FALSE						
		5	2	3	FALSE	2		2			
3	3	4	3	5	FALSE						
		5	3	3	FALSE				3		
4	4	5	5	3	TRUE						
	5					5				3	5