

SOFTWARE DEVELOPMENT

Units 3 and 4 – Written examination



2022 Trial Examination

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: D

Explanation:

The answer to the question is ‘Yes’ or ‘No’ which is Boolean.

Question 2

Answer: A

Explanation:

A simple list of numbers indexed 0,1,2,3,4,... Suffices and uses the least space of the viable options.

Question 3

Answer: A

Explanation:

Both take parameters so NOT D, Functions do return values and Procedures do not (there are very rare exceptions to this rule, but the definition of a function and procedure is that functions return a value whereas procedures do not)

Question 4

Answer: D

Explanation:

The steps in the While loop are repeated (iterated), the test to determine when to start and stop iterating happens at the start “pre”.

Question 5

Answer: D

Explanation:

Pivots are not used in A,B or C

Question 6

Answer: B

Explanation:

A syntax check occurs during compilation, it checks the code of a solution rather than the data.

Question 7

Answer: D

Explanation:

Answers A,B,C are all measures of usability (non-functional) and/or efficiency.

Question 8

Answer: A

Explanation:

Answer B is about constraints, Answer C is a list of non-functional requirements and Answer D is about overarching organisational goal rather than scope.

Question 9

Answer: A

Explanation:

Data Dictionaries list variables, Pseudocode documents algorithms and UI mockups are screen (user interface – UI) designs

Question 10

Answer: A

Explanation:

Not B (A,B,C are not processes), Not C (this gives only a partial description of the diagram), Not D (A,B,C are not code blocks)

Question 11

Answer: B

Explanation:

Evaluation criteria are used to rate design options as well as evaluate the solution in stage 4. Answer D is incorrect because the input comes from users not from project team members.

Question 12

Answer: D

Explanation:

Affordance is about the ability of users to understand and use the potential functionality of a system.

Question 13

Answer: A

Explanation:

A Data Context Diagram is a high level “in from and out to” diagram, it does not show internal processes nor individual use cases.

Question 14

Answer: D

Explanation:

A, B, C are all evaluation criteria, option D is an example of an evaluation strategy rather than an evaluation criteria.

Question 15

Answer: C

Explanation:

Answer A is the Waterfall model, Answer B is the Agile model and Answer D is incorrect because the basic 4 stages of the PSM are present in all 3 Development models.

Question 16

Answer: C

Explanation:

Packets which are intercepted between sender and receiver, either modified or copied, then allowed to continue to their destination are typical of a Man-in-middle attack (they are intercepted in the middle of their journey).

Question 17

Answer: D

Explanation:

SQLi stands for Structured Query Language injection, queries are programmes which interrogate databases.

Question 18

Answer: B

Explanation:

No Health information is stored so not A or C, the solution is built on contract to the Victorian Government and it stores personal information so the PDPA applies. The copyright act applies because the Solution has been built so the IP (intellectual property) resides with one of the organisations depending on the contract between them.

Question 19

Answer: A

Explanation:

Ethical issues deal with the impact of new technology on society, fully legal, secure and well-designed systems can still have some detrimental effects.

Question 20

Answer: A

Explanation:

Solid State Drives are faster than Hard Disk Drives and communications with the Cloud.

SECTION B – SHORT ANSWER (20 MARKS)

Question 1 (4 marks)

To search the DSV file, each of the 4 strings between the spaces would be stored as 4 separate items. A maximum of 4 comparisons would need to be made with the word ‘Cat’ to determine whether that word is in the list of 4 items. If the search were conducted sequentially from the left, then it would take 3 comparisons to find the word ‘Cat’.

To search the TXT file, the 17 character string “Ben Jerry Cat Dog” would have to be searched as a series of sub-strings of length 3. Characters 1-3, 2-4, 3-5, 4-6 and so on would be tested for a match with the word ‘Cat’. This generates a maximum number of comparisons of 15. If the search were conducted sequentially from the left, then it would take 11 comparisons to find the word ‘Cat’.

Question 2 (3 marks)

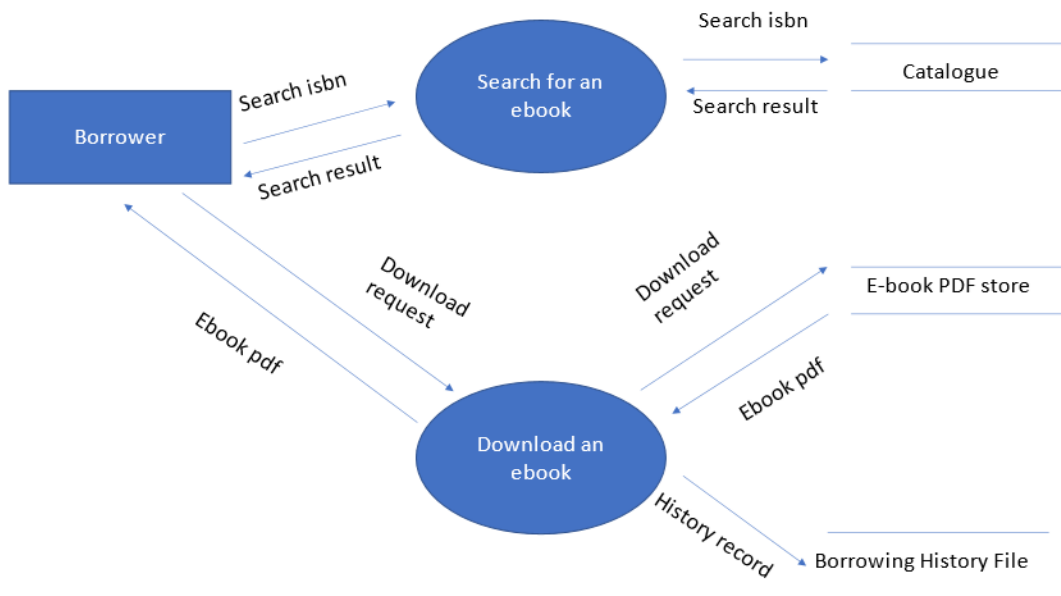
- i. Selection sort
- ii. No, this algorithm does not use a pivot

Question 3 (4 marks)

Line	item	The-value	found
2		2	
3		2	
4		2	
5		2	
6		2	
7		2	FALSE
8	22	2	FALSE
9	22	2	FALSE
10	22	2	FALSE
11	22	2	FALSE
8	1	2	FALSE
9	1	2	FALSE
10	1	2	FALSE
11	1	2	FALSE
9	3	2	FALSE
10	3	2	FALSE
11	3	2	FALSE
12	3	2	FALSE
13		2	FALSE
14		2	FALSE
15		2	FALSE

Line	item	The-value	found
2		3	
3		3	
4		3	
5		3	
6		3	
7		3	FALSE
8	22	3	FALSE
9	22	3	FALSE
10	22	3	FALSE
11	22	3	FALSE
8	1	3	FALSE
9	1	3	FALSE
10	1	3	FALSE
11	1	3	FALSE
9	3	3	FALSE
10	3	3	FALSE
11	3	3	TRUE
12	3	3	TRUE
13		3	TRUE
14		3	TRUE
15		3	TRUE

Question 4 (4 marks)



Question 5 (2 + 1 = 3 marks)

- a) Answers must address the connections of the webserver laptop;
- Mobile hotspot connection to the internet – vulnerable because mobile connection to internet can be intercepted
 - Free wifi connection to the internet – vulnerable because free wifi easily intercepted
 - Homewifi connection to the internet – vulnerable if visitors to home or people in proximity of home can access wifi
 - Two of the above gets full marks
- b) Answers must address other devices connected to the webserver laptop in the home:
- Multiple devices in the home share data with the webserver laptop, malware can thus be shared across devices
- c) Any 3 of:
- Never use public wifi for the business machine
 - Use a VPN connection to the internet
 - Remove business machine from WPAN by turning off data share with other devices
 - Remove visible wifi Password from living area
 - Stop using home machine as webserver – host via a secure third party webservice

Question 6 (1 mark)

Any 2 of the following:

- DPA applies to all businesses with turnover >3 mill DPPA does not
- DPPA applies to all businesses contracting to Government, DPA does not
- DPA is nationwide, DPPA is Victoria only
- DPPA is slightly stronger legislation in some areas

SECTION C – CASE STUDY (60 MARKS)

Question 1 (2 + 1 = 3 marks)

- a) Following 5 Acts in the Study Design:
- Health Act does NOT apply, no health data involved.
 - Copyright does apply as members own IP of their own projects and photos of their own projects.
 - Data Protection Act applies as AMSA sells projects with an income of over the 3AUDM threshold and stores personal information of both members and customer/users.
 - PDPA does not apply as AMSA is not a government agency and is not contracted to government (receiving a grant is not the same as being contracted to government).

- SPAM Act does apply as AMSA have indicated they want to send electronic marketing information to customers who have purchased. SPAM act requires that any marketing email have an “unsubscribe” button.
- b) Legal requirements are found in the Constraints section of the SRS as they spell out the legal limitations on the project (full marks). They may also be found in the requirements section where legislation requires protections to be built into the design (optional extra).

Question 2 (3 marks)

Any three of the APP’s including but not limited to:

- Consent to store obtained
- Privacy Policy accessible
- Pseudonym available
- Data use transparent
- Unsubscribe option on marketing emails
- Server secure (not in cloud, physical protection, anti-virus, anti-spyware, VPN connection or cable connections etc)
- Quality assured 3rd party financials link, accredited provider abiding by Victorian/Australian legislation

Question 3 (2+2+2 = 6 marks)

- Any two of User, Site Owner, Third party invoicing and banking app
- Any two of Member-Maker projects database, Purchase History File, Suppliers Database
- Yes, purchase requests are stored when the request is made, no data about the success or failure of the invoicing and banking process flows back to the Purchase History File.

Question 4 (6 marks)

- 1 mark for selecting an appropriate data collection method
 - 1 mark for explaining why it is appropriate
- i. Usability and appearance – Reports (design/documentation for the existing system) is the most appropriate method of collection since a seamless UI experience is an explicit non-functional requirement
- ii. Purchase History requirements – Interview with the site manager because this enables deep quality input – there is only one person so time constraints are not an issue and Reports (research the legislation) to be crystal clear on all legal requirements
- iii. Integration requirements – Interview with the third party vendor to determine that they have met legal requirements (preferably with an independent auditors report) and are a reliable supplier of financial processing services. Observation of the third party application and Reports (interface design specifications).

Question 5 (4 + 1 + 1 + 2 = 8 marks)

Functional Requirements (any 4)

- Display (and catalogue) list of benefactors
- Display (and catalogue) list of preferred suppliers
- Links to preferred supplier websites
- Display, catalogue and store images of various forms of knitting (how to perl, how to cast on)
- Sales processing for members projects
- Link to third party automated financial processing of invoices
- Maintain records of user purchases by user and by maker

Non-Functional Requirements (any of these)

- Seamless User Interface integrated with existing Website
- Legal requirements around personal information
- Interoperable across laptop, tablet and phone

Constraints (any of these)

- Legal constraints around personal information
- Existing Interface Design maintained

Scope

- Excludes the actual processing of Financials between customer and AMSA, includes passing AMSA banking details to third party
- Excludes the actual processing of Financials between member and AMSA, includes recording which member projects have sold

Question 6 (10 marks)

- a) Control structures include (any 2 of):
 - IF statements (Selection controls)
 - GO TO statement (Sequence control)
 - FOR statement (Iteration control)
- b) Parsed_keyword_array holds up to 5 string values, **a one-dimensional array** with integer index is the most economical way to store this information
- c) Search_maker is chosen from a dropdown list of valid, clean options, so this variable does not need to be validated or cleansed.
- d) The DISPLAY instruction is executed 4 times.
- e) The # hash symbol indicates a non-executable comment either at the start of a line or part way through a line, indicating text to the right of the # symbol is not executed, but is to be read as an aid to understanding

Question 7 (4 marks)

a)

Test	Test Data Value	Expected Result	Actual Result
Control Characters are detected when present in Pattern Keyword Inputs	Wood+desk	“ Valid” message	
	A+b+c+d+e		
	Wood+!Gold	“ Invalid” message	
	!Gold+w+a+b+c		

b) Avoid free entry keywords, answers may include variants of the following:

Associate a limited number of keywords with each project (eg. Wood/metal/other; furniture/ornament/other) then allow users to select a group of objects which have particular pre-defined keywords using drop-down lists of known keywords. The solution then displays a list of individual objects from the projects which have keywords that match the ones chosen by the user.

Question 8 (2 + 1 + 3 = 6 marks)

a) Students are expected to provide a diagram and provide at least 2 points of description and 3 points explaining why waterfall suits from the examples below or another valid reason

Waterfall Diagram

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graph TD
    A(Analysis) --> B(Design)
    B --> C(Development)
    C --> D(Evaluation)
    
```

Explain the model

- Each stage in order
- No iteration, repetition or back tracking
- Highly controlled
- Very clear and well defined
- Can manage dependancies

Why this is appropriate, any three of:

- This project has a well defined scope
- This project does not involve new technology, high risk or innovation
- The budget is available as a lump sum rather than incrementally
- The client has not asked to actively participate in small stages of the project, they are happy to see the final result on completion in the exact same style as their existing system
- The benefits of delivery by incremental iteration through project scope that AGILE and SPIRAL bring are not relevant to this project so the cost of both over WATERFALL is not justified.

Question 9 (8 marks)

- i. Individual user interface screens – screen mockups/ layout diagrams, these show what the screens will look like
- ii. Records in the Purchase History File – data dictionary, these describe the fields in each record including data type
- iii. Processing logic in the “Search Projects” process – pseudocode, this describes the programming code without being programming language specific
- iv. Detailed inputs to, processing and outputs from the “Search Projects” process – IPO chart, these show the inputs and outputs to individual processes and describe the processing steps or algorithm for a process

Question 10 (3 marks)

- The project database contains a pseudonym identifier for the maker of the project and no other personal information, this could be stored in the cloud.
- The supplier database contains business information only and could also be stored in the cloud.
- The Purchase History file contains personal information so should be stored in a secure location where Australian Law is complied with, so a local server is recommended.

Question 11 (3 marks)

- The project database should be backed up, new projects would come about sporadically so a daily or weekly incremental backup would suffice with an infrequent (annual or quarterly) full backup. A periodic purge of projects more than 3-5 years old would also be recommended. Students get a mark for mentioning incremental and full back up concepts and identifying a realistic timeline suitable to the frequency of information change.
- The supplier database would be updated very infrequently once established, it would also be a fairly small database. So an infrequent (monthly) back up would suffice. Students get a mark for mentioning infrequent update, small size => infrequent full back up.

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- The Purchase History file contains personal information but no financial information about either members or user-customers. Legal requirements dictate that personal information must be kept up to date (accurate) so a daily incremental back up and monthly full backup would suffice. Personal information should not be kept for longer than necessary, so archival after 6-12 months would be a reasonable recommendation followed by disposal after another 6-12 months. Students get a mark for noting that:
 - No financial information is stored
 - Personal information is stored
 - => must be accurate => more frequent backups
 - => must only be used for intended purposed => not retained unnecessarily => archive and dispose reasonably quickly