Mark Scheme (Results)

Summer 2025

Pearson Edexcel International Advanced Level in Information Technology (WIT13) Paper 1

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Additional guidance	Mark
1(a)	Award **one** mark for any of the following, up to a maximum of **two** marks: • Input/transcription/human errors (1) • Malware/hacking/lack of access rights (1) • Processing errors/Program errors/bugs/lack of validation (1) • Undetected/uncorrected transmission errors (1) • Hardware failure (1)	Do not award people giving false, incorrect or inaccurate data, as it is in the question. Award an example if mapped to a single bullet	**2**

Question number	Answer	Additional guidance	Mark
1(b)(i)	Award **one** mark for any of the following, up to a maximum of **two** marks: 1. Name/title (1) 2. Data type (1) 3. Length/size (1) 4. Required? (1) 5. Validation type/method/rule (1) 6. Key status (primary, foreign) (1) 7. Example data (1) 8. Description/notes (1) 9. Alias/alternative name (1)	Do not award literal examples of data held in the fields e.g. "John Smith" Do not award: • Relationships • Validation checks (range, pattern, format, etc.)	**2**

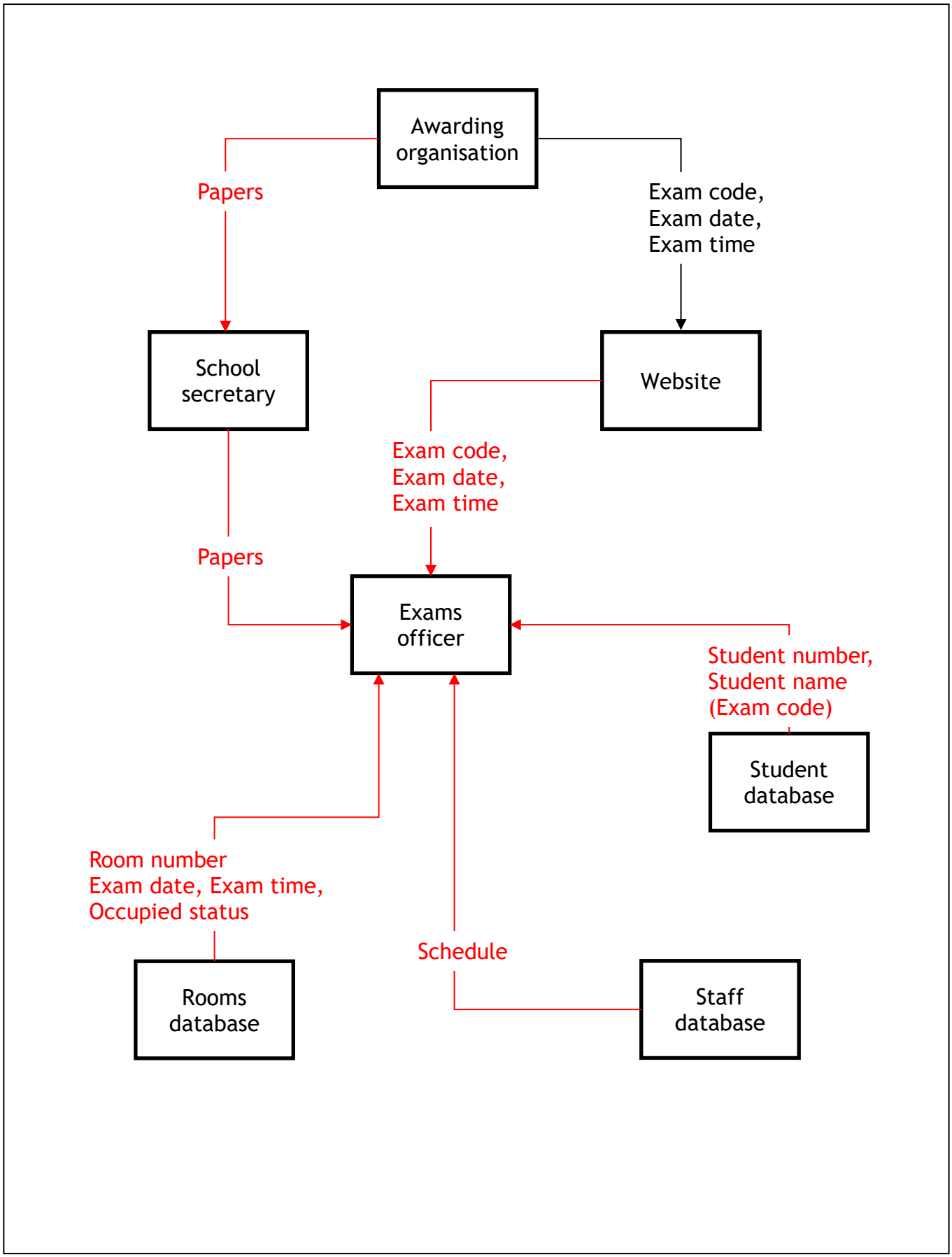
Question number	Answer	Additional guidance	Mark
1(b)(ii)	Award **one** mark for any of the following, up to a maximum of **two** marks: 1. Restrict/manage/authenticate access to the data (1) 2. Provide a (limited) view of the data (based on group membership/role) (1) 3. Interpret/execute commands (queries/SQL/Data manipulation language/programming interface) (1) 4. Backup/restore data (1) 5. (Bulk) import/export data (from external sources) (1) 6. Synchronises (simultaneous) updates to the data between users / locks a record to avoid two users changing it at the same time (1) 7. Performance related functions/monitors access times/reports statistics (1) 8. Provides audit trails (to identify who has changed what) (1) 9. Validates any data against a set of rules (1)	For Bullet 3 allow tasks that would require a query: • Reports • Filtering Do not award statements about security without appropriate expansion to map to a single bullet Do not award: • Protect from hacking • Tables, keys, relationships, data dictionary • Normalisation • Data dictionary • Structured or Unstructured	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>1(c)</td><td>Award one mark for each two correct cells:

<table>
<tr><th>Situation</th><th>Record keeping</th><th>Decision making</th><th>Project management</th></tr>
<tr><td>Running a what-if scenario to find out the most cost-effective number of students per class</td><td></td><td>✓</td><td></td></tr>
<tr><td>Tracking the amount of photocopying paper used so it can be reordered just before running out</td><td>✓</td><td></td><td></td></tr>
<tr><td>Comparing the cost of paper textbooks to digital subscriptions</td><td></td><td>✓</td><td></td></tr>
<tr><td>Scheduling the annual electrical testing of the devices</td><td></td><td></td><td>✓</td></tr>
</table></td><td>Do not award any marks on a row with more than 1 tick

One correct = 0
Two correct = 1
Three correct = 1
Four correct = 2</td><td>2</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
1(d)	Award **one** mark for each of: 1. Papers move from awarding organisation to school secretary (1) 2. Schedule moves from website to exams officer (1) 3. Student number and Student name move from student database to exams officer (1) 4. Schedule/timetable/(staff number, date, time, working status)/(names of staff free) moves from staff database to exams officer (1) 5. Room number, Exam date, Exam time, Room status moves from rooms database to exams officer (1) 6. Papers move from school secretary to exams officer (1)	Arrows must be unidirectional Allow any labels that are sufficient for solving the problem For MP3, it must be clear that individual student identification numbers are returned, not a quantity value. Do not award lines without directional arrows Do not award where there is more than one connection between two boxes Do not award an arrow containing inappropriate labels, i.e. date from student box Award a maximum of 5 marks in diagrams where there are lines between incorrect entities, e.g. between Website and School secretary Ignore directional arrows representing submission of database queries	**6**


Awarding organisation
Papers
Exam code, Exam date, Exam time
School secretary
Website
Exam code, Exam date, Exam time
Papers
Exams officer
Student number, Student name (Exam code)
Student database
Room number Exam date, Exam time, Occupied status
Schedule
Rooms database
Staff database

Question number	Answer	Additional guidance	Mark
2(a)	Award up to **two** marks for a linked explanation such as: 1. Only having two options to select from (1) means the user will find the web page easy to complete (1) 2. Having only essential information/images (1) means that the information is easy to locate (1) 3. The use of black on white/contrast (1) helps users with limited vision/colour deficiencies to read the information (1) 4. The use of clear/non-serif fonts and size (1) means the information is easy to read (1) 5. The text is written in clear and simple language (1) which means people with learning difficulties/a poor grasp of English will understand what they have to do (1) 6. The buttons are large and there is only one choice for them to make (1) which means people with a motor impairment/reduced dexterity will be able to respond to the question (1)	For both marks, the expansion must follow/associate with the statement. Do not award responses about: • the user's emotions or enjoyment • accessibility, as it is given in the question • generic terms, e.g. easy, simplistic, without clarification Do not award responses related to screen readers, as there is no evidence in Figure 1	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>2(b)</td><td>Award one mark for each correct cell:

<table>
<tr><th>Situation</th><th>Big Data issue</th></tr>
<tr><td>The department of transport plans to collect more than 1024 tebibytes of data next year, so needs more cloud storage to store the data</td><td>Volume/Quantity</td></tr>
<tr><td>The department of transport collects data from traffic cameras, sensors in the road, the weather office and social media posts to predict traffic congestion</td><td>Variety / Mixture of structured and unstructured</td></tr>
<tr><td>The department of transport requires all vehicle owners to update their details using an online form once a year</td><td>Veracity/Accuracy</td></tr>
<tr><td>The department of transport collects real-time data from traffic cameras and sensors in the road of every vehicle entering and exiting motorways</td><td>Velocity/Frequency/Speed</td></tr>
</table></td><td></td><td>4</td></tr>
</table>

Question number	Answer	Additional guidance	Mark
2(c)	Award up to **two** marks for a linked explanation such as: 1. Data mining techniques are applied to Big Data to create models of fraud (1) so that the models can be applied to new data to identify fraud (1) 2. Pattern recognition finds patterns in known fraudulent data (1) so that it can be used to test any future data to see if it fits the pattern (1) 3. Analysis of historical data (descriptive analytics) has identified patterns in past frauds (1) so that they checked against the current behaviours (of people) (1)	For both marks, the expansion must follow/associate with the statement. Responses must be about Big Data, not just data stored in a database	**2**

Question number	Answer	Additional guidance	Mark
2(d)	Award one mark for each of: 1. Three tables, distinguishable as vehicle, employee, loan (1) 2. Single primary key in vehicle table (1) a. AssetNum 3. Single primary key in employee table (1) a. EmpNum 4. Single primary key in loan table (1) a. LoanID OR b. Composite (AssetNum, EmpNum, StartDate) 5. Only two foreign keys in loan table AND there are no foreign keys in any other tables (1) a. AssetNum b. EmpNum 6. Correct use of notation (brackets, underlined primary, asterisked foreign (1) Example: Vehicle (AssetNum, Type) Employee (EmpNum, Lastname) Loan (LoanID, AssetNum*, EmpNum*, StartDate, EndDate) **OR** Loan (AssetNum*, EmpNum*, StartDate, EndDate)	Do not award if more than the required number of primary/foreign keys are included in a table Allow semicolon for comma between field names Award a maximum of five marks if response is not given in parenthetical notation Ignore transcription errors, e.g. underscores, spaces, misspellings, ID instead of Num, etc.	**6**

Question number	Answer	Additional guidance	Mark
3(a)(i)	Award **one** mark for any of the following up to a maximum of **two** marks: • Image recognition/machine learning program is given lots of photographs of different species (as training data) (1) • Image recognition/machine learning program determines/learns common characteristics of each species (1) • Image recognition program applies learned characteristics to identify the species of the mammal in a new photograph (1)	Allow machine learning program in third bullet, although the application of the resulting model is done after the machine learning Do not award: • Comparisons between two images • Comparison to images stored on a database	**2**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	Award up to **two** marks for a linked explanation such as: • Pattern recognition could be used to identify weather conditions during mammal visits (1) in order to find out the conditions when more mammals are likely to visit (1) • Pattern recognition could be used to identify migratory patterns (1) in order to predict when the mammals will arrive/visit (1) • Pattern recognition could be used to identify abundance in food sources in feeding grounds (1) in order to predict when populations of mammals might increase (1) • Pattern recognition could be used to differentiate between dolphins' whistles (1) in order that the meaning of different whistles can be determined (1)	For both marks, the expansion must follow/associate with the statement. Do not award: • Definitions of pattern recognition • How pattern recognition works • 'Behaviours' without clarification, as it is given in the question	**2**

Question number	Answer	Additional guidance	Mark
3(b)	Award up to **two** marks for a linked explanation such as: • Scalability (1) because resources (storage, processing power) can be changed (dynamically) to handle large amounts of data (1) • Fast/small processing time (1) because cloud services have advanced analytic tools (1) • Fast/small processing time (1) because cloud services have distributed/parallel processing capabilities (1)	For both marks, the expansion must follow/associate with the statement. Do not award • Confusion with cloud storage as the question asks for 'processing data' not 'storing data' • Maintenance of data, e.g. backup/recovery, security • Accessibility, e.g. 24/7, from anywhere with an internet connection	**2**

<table>
<tr><th>Question number</th><th>Answer</th><th>Additional guidance</th><th>Mark</th></tr>
<tr>
<td>3(c)</td>
<td>Award one mark for each of:

1. Task 3: Correct start date, end date and duration (1)

2. Task 4: Correct start date, end date and duration AND dependent directly on completion of Task 2 (1)

3. Task 5: Correct start date, end date and duration (1)

4. Task 6: Correct start date, end date and duration AND
Task 7: Correct start date, end date and duration AND
Task 7 dependent directly on completion of Task 6 (1)

5. Task 6: Dependent directly on completion on Task 3, Task 4 and Task 5 (1)

6. Task 5: Two-day early start indicated AND Task 7: One-day overrun indicated AND Task 5: Early start date dependent directly on completion of Task 1 (1)

Note on predecessors:

<table>
<tr><th>Task</th><th>Predecessors</th></tr>
<tr><td>1. Application design handover meeting</td><td></td></tr>
<tr><td>2. Write text script for commentary</td><td>1</td></tr>
<tr><td>3. Select images to be used in application</td><td>2</td></tr>
<tr><td>4. Record commentary using text script</td><td>2</td></tr>
<tr><td>5. Create prototype application</td><td>1</td></tr>
<tr><td>6. Put images and commentary into prototype</td><td>3, 4, 5</td></tr>
<tr><td>7. Test application using interactive screens</td><td>6</td></tr>
</table>
</td>
<td>Ignore early start or late finish Xs, except for MP6. Assume arrow points to the real start date

Bullet 1:
• Ignore dependencies
• Marks in row 3 columns 8-11 (ignore others)

Bullet 3:
• Ignore dependencies
• Marks in in row 5 columns 8-12 (ignore others)

Bullet 4:
• Marks in row 6 columns 13, 14, 15 (ignore others)
• Mark in row 7 columns 16, 17 (ignore others)</td>
<td>6</td>
</tr>
</table>

Task	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	X															
2		X	X													
3				X	X	X	X									
4							X	X								
5		(X)	(X)	X	X	X	X	X								
6									X	X	X					
7												X	X	(X)		

Question number	Indicative content	Mark
4a	Responses should be in the context of a distributed database system. **Failure** • Increases fault tolerance, as if one system stops working, then a replica can pick up the work • Identifying specific locations of failures may take longer than on a single system database **Concurrency** • Searches/queries of the distributed database can be broken down and parts of it executed in different DBMS at the same time • Synchronisation may require complex techniques to manage • Lack of mechanisms for synchronous updates (lack of record locking) could cause updates to be lost, leading to issues with data integrity **Performance** • Data can be retrieved from the nearest copy, thereby decreasing perceived elapsed time • When data is stored near to the location where it is used, it can be accessed quicker • When one server/database/DBMS is very busy, then the work load can be shared with the others • Increasing the amount of data stored is easier as it can be stored in any available location • Replication, the duplication of data across systems, means that the different locations must be kept in synch • Records must be locked across several databases to be changed, so might slow down the database performance **General** • Database fragments/parts of the data are stored physically separate from each other • Fragments may be duplicated/stored in more than one location • A distributed system is one in which individual computers work together/cooperate **to achieve a common goal**	**6**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	• Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a superficial and unbalanced discussion.
Level 2	3–4	• Demonstrates knowledge and understanding which is mostly relevant but may include some inaccuracies. • Applies understanding to make some coherent connections, leading to a discussion that shows some development, but may be unbalanced.
Level 3	5–6	• Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a balanced and fully developed discussion.

Example

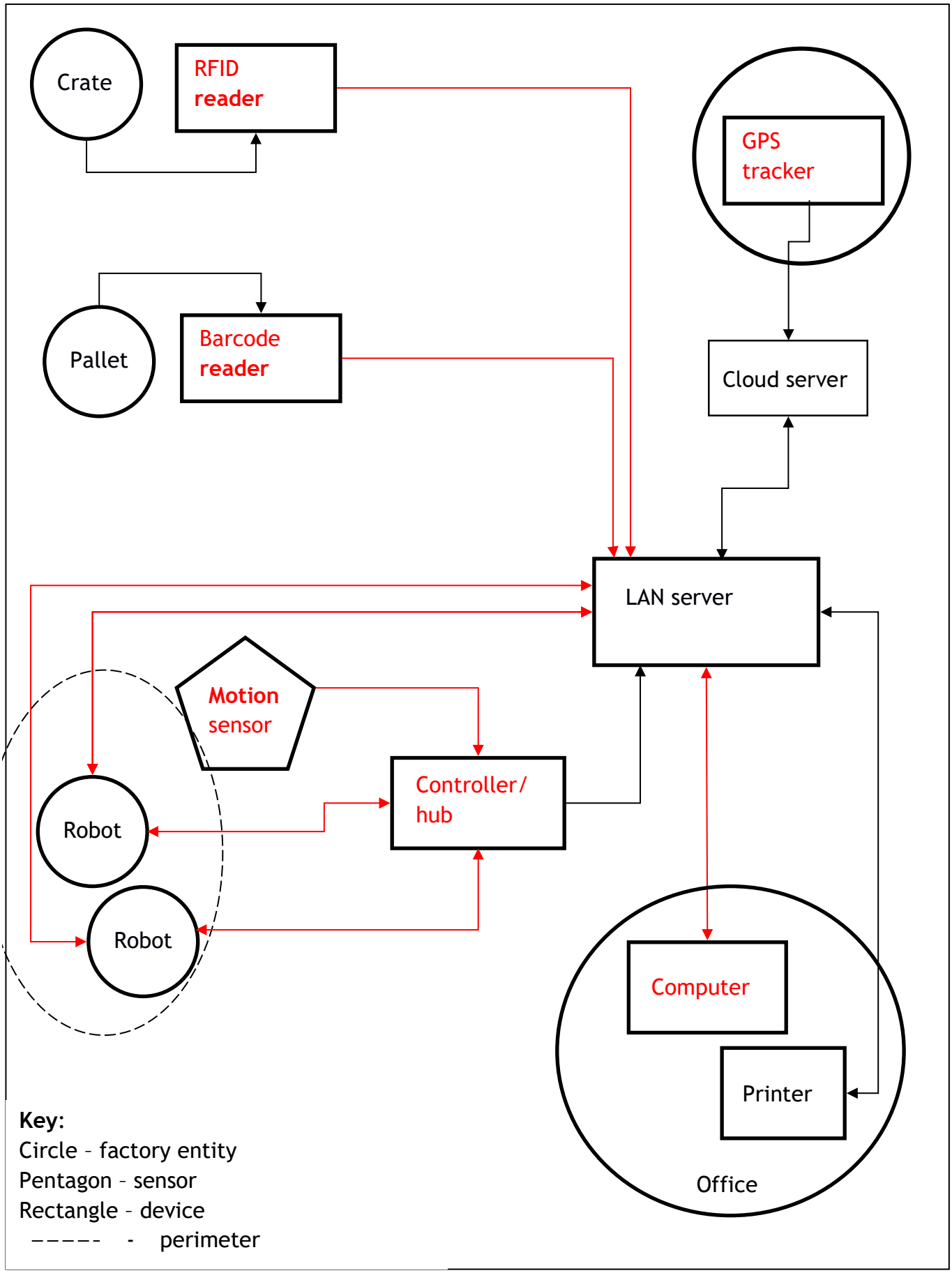
Replication means that copies of the databases are kept across many different machines.

If the database in one factory fails, then that factory can still get to all the information, just using a different database, in a different location. It should be transparent for the factory. They don't need to know which database they're using.

Concurrency means that queries can be done at the same time. Very complex database queries will be split into separate queries with each being done on different databases. Again, the factory will get the answer, but not need to know how it was done or even which database was being used. This means that the factories get answers quicker.

Performance in distributed databases are affected by distance. In the event that the factory is using its own database, i.e. the one nearest it, the response times will be very good. If the data is accessed in a database further away, then the access time will be slower.

Question number	Answer	Additional guidance	Mark
4(b)	Award **one** mark for each of: **Labels** 1. RFID **reader** in rectangle nearest crate (1) 2. Barcode **reader** in rectangle nearest pallet (1) 3. GPS (tracker) in rectangle inside forklift (1) 4. **Motion** (sensor) in pentagon (1) 5. Computer/PC in rectangle inside office (1) 6. (IoT) Controller/hub in rectangle nearest robots (1) **Connections** 7. One-way arrow from RFID reader to LAN server (1) 8. One-way arrow from barcode reader to LAN server (1) 9. One-way arrow from motion sensor to controller/hub (1) 10. **Two** two-way arrows from (IoT) **controller/hub** to robots (1) 11. **Two** two-way arrows from robots to LAN server (1) 12. Two-way arrow from computer to LAN server (1)	Award any office type device for computer Award connections between the appropriate boxes, even if the labels inside the boxes are not correct Terminators on arrows must be accurate Barcode and RFID must include **READER** **MOTION** sensor must not be sensor alone Award a maximum of 11 marks: • Where there are more connections than the 8 required Ignore • Labels on lines, such as optic, wireless, etc. Do not award: • 'spreadsheet' or any other software/app for MP5 • 'server', 'microcontroller', 'computer', 'program' for MP6 • Any additional symbols that do not exist in the original diagram	**12**


Crate
RFID reader
GPS tracker
Pallet
Barcode reader
Cloud server
LAN server
Motion sensor
Controller/ hub
Robot
Robot
Computer
Printer
Office
Key:
Circle - factory entity
Pentagon - sensor
Rectangle - device
----- - perimeter

Question number	Indicative content	Mark

5	Responses should be in the context of an application to find computers that are not being used in a university.
	
	Definition
	• Iterative approach/methodology
	• Constant, incremental delivery of product/value instead of all at the end
	• Short development cycles
	• Embrace chaos
	• Allows for unexpected problems
	• The 12 principles set out in the agile manifesto:
	  ○ Customer satisfaction
	  ○ Welcome changing requirements
	  ○ Deliver frequently
	  ○ Daily collaboration (business, developers)
	  ○ Give individuals and teams independence
	  ○ Use face-to-face communication
	  ○ Progress is measured by working deliveries
	  ○ Maintain a constant pace for sustainable development
	  ○ Pay continuous attention to technical excellence and good design
	  ○ Reduce the potential for unproductive work and bureaucracy
	  ○ Encourage teams to be self-organising
	  ○ Build in reflection, at regular intervals
	
	Benefits
	• Respond to changes/student requests quickly
	• The computer science students can start the project, even if the finished product is not fully understood
	• Deliveries can be done iteratively, with limited functionality, rather than a fully functional product at the end, so the students can see what they're going to get
	• Deployment can be quick and students can use the incomplete product to give feedback
	• Detect and fix issues quickly, as more frequent testing is done by the students
	• Decreased amount of bureaucracy/paperwork done by the development team frees up time for focusing on objective
	• Quick feedback cycles from the students, means the project will go quickly.
	• Easy to experiment and test ideas out, so if the students don't like a feature, it can be backed out.
	
	Drawbacks
	• Set aside time for daily scrum so all the developers know what is happening.
		12

	• Need access to the customer/client on a regular/ad hoc basis, so other students will be needed for testing • Decision-making has to be done quickly or the computer science students are not working • Need a flexible budget, as the amount/cost of resources is not known up front • Need a flexible schedule, rather than a hard deadline • Documentation often lags, which may impact students and new team members trying to join the teams • Progress has to be monitored over several cycles, rather than fixed points in the development • Developers can't move around to other projects, because the short cycles mean they'll be needed again very soon • No clear end means that projects may never actually finish • Lack of overall upfront design (UX/architecture) may lead to problems • Teams get side-tracked onto new functionality rather than working on targets already identified • Big features/functions get put off because they can't be done in the short cycles • Lack of up-front design thinking leads to designers doing more work because of negative customer feedback • Highly dependent on team members and their knowledge. Can be impacted if team members leave. **Vocabulary** • Iterative • Incremental • Plan • Design • Develop • Release/deploy • Scrum • Sprints **Conclusion** • A conclusion does not have to be stated explicitly. • A conclusion can be inferred by the statements in the evaluation. **Note** • Focus is on agile, so no requirement to compare against other methods (waterfall)	

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–4	• Demonstrates limited knowledge and understanding, some of which may be inaccurate. • Applies understanding with limited coherence to produce a response that lacks development. • Demonstrates limited awareness of competing arguments. • Conclusion, if present, is generic or unsupported.
Level 2	5–8	• Demonstrates knowledge and understanding, which is mostly relevant and may include some inaccuracies. • Applies understanding to make some coherent connections and a partially developed response. • Demonstrates some awareness of competing arguments, but this may be unbalanced, and partially supports conclusion with evidence.
Level 3	9–12	• Demonstrates accurate and relevant knowledge and understanding throughout. • Applies understanding coherently to produce a fully developed response. • Demonstrates an awareness of competing arguments and supports conclusion with evidence.

Example

Using an agile approach means that development of the application will take place in iterations, cycles, or sprints. This will allow a small piece of functionality, such as showing the room numbers and locations, to be developed in the app, first. Then, the students can use the app and give feedback to the developers about the user interface and functionality.

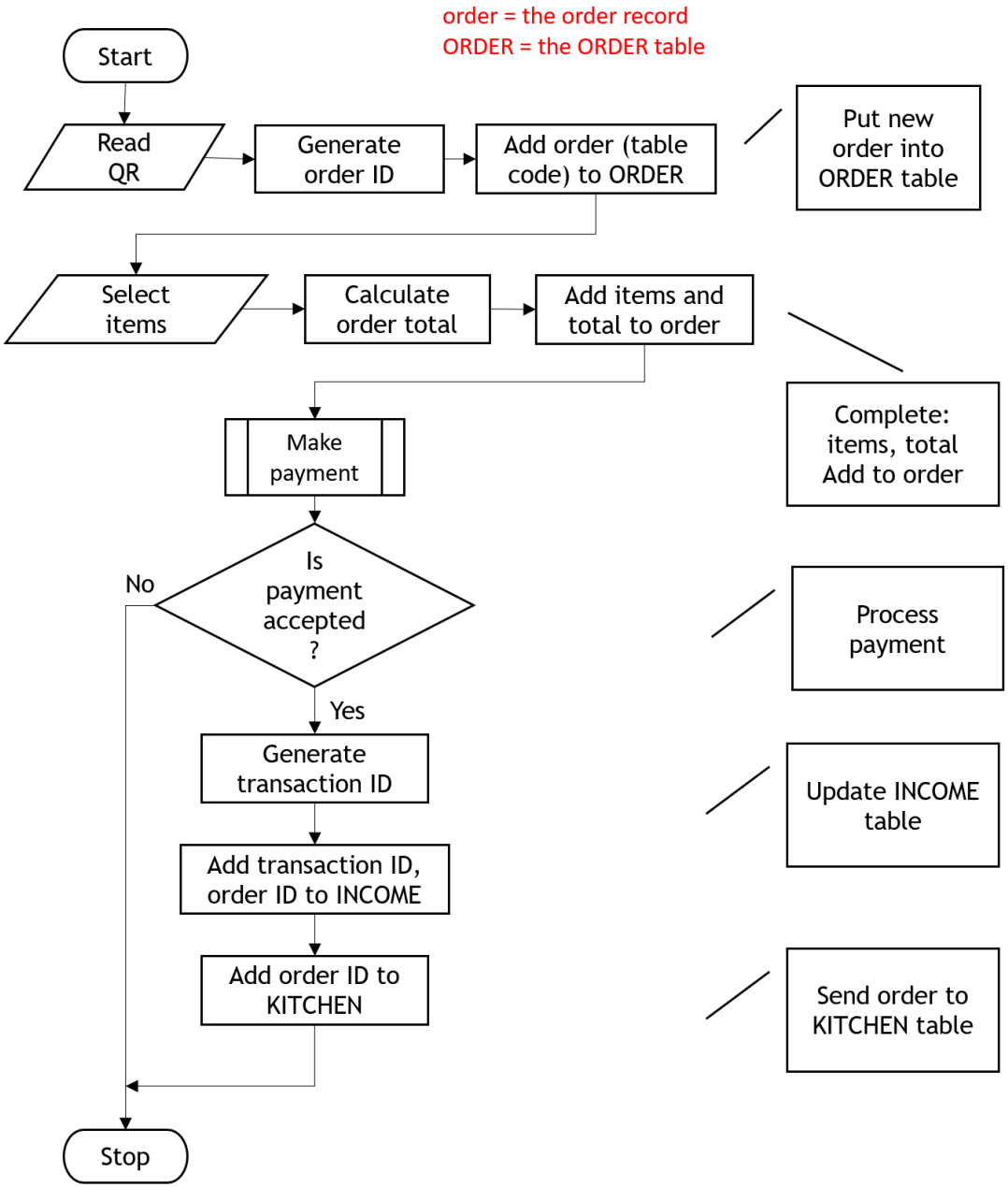
The developers, then need to take the feedback, plan how to address it, change the design, redevelop the application, and release it to the students again. This means the students will be able to change the design, if it is not what they envisioned.

Developers and possibly one or two students should meet daily for discussing what has been done and what is to be done. This meeting is a scrum. Having daily meetings means that the students and the developers will be able to resolve any problems really quickly.

On the other hand, the developers may not have access to the students every day for a scrum. Students may not be able to respond quickly enough to a new release, causing the developers to be idle. If the students don't have a vision for an application that will solve their problems, or even if they're not able to state their problems, the application may never actually be finished or fit for purpose. If the university is paying the developers, there will probably be a fixed budget, which could limit how much time is spent on development.

Question number	Answer	Additional guidance	Mark
6	Award **one** mark for each of: **Logic of the problem** 1. Order ID generated for new order record (1) 2. Add record (holding table code, items) to ORDER DB (1) 3. Total cost of selected menu items calculated / added to order record (1) 4. A test (ignore shape) to verify if payment has worked (1) 5. Failure of payment goes directly to end/stop / back to make another attempt to make payment (1) 6. Transaction ID generated for new INCOME record (1) 7. Add record to INCOME DB (holding transaction ID and order ID) (1) 8. Order ID added to KITCHEN DB **after payment** is accepted (1) 9. Design represents a fully functional solution (1) **Use of annotation regardless of logic** 10. Accurate use of flowchart notation (Appendix 7) throughout (1) ○ Have a start and a stop symbol ○ Decision boxes have exactly one input, exactly two outputs with yes/no labels ○ Fully connected with arrows/lines (no hanging symbols)	Allow process (rectangle) for subprocess symbol Allow adding items to order in a loop for part of bullet 2 that deals with items only. Ignore malformed loop, as long as items are added to the record. Award KITCHEN, INCOME, ORDER as interaction with databases, regardless of words around it. Do not award interaction with database with lower case, e.g. 'order is sent to Kitchen/kitchen' Do not award MP10, where there is no use of a decision box For MP10, use of symbols must have processes in process boxes, input/output in parallelograms as in Appendix 7 of the specification.	**10**

Example (Comments not required):



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