

**Coursework Assignment Brief**  
**Assessment - Undergraduate**

***Academic Year 2024-25***

Module Title: Modern Data Stores			
Module Code: CMP6207			
<b>Assessment Type</b> CWRK (Report)	<b>Level</b> 6	<b>Weighting</b> 60%	<b>Word Count/Workload</b> 4,000 words
<b>Dates</b> Monday 5 <sup>th</sup> May 2025	<b>Submission Time</b> 3:00pm	<b>Module Leader</b> Konstantinos Vlachos	<b>Time Limit</b> N/A

**This assessment consists of:**

- Submission 1: A professional standard report for a MongoDB NoSQL database system that you will design and implement for IoT Things Home Automation Solutions, which is a start-up UK SME. The areas which will be covered in your report are expressed in the assessment details. The report is worth 60% of this module's assessment.

**Learning Outcomes Assessed:**

1. Appraise and effectively communicate the different principal types, theories and technologies associated with NoSQL databases.
2. Critically compare, analyse and evaluate traditional Relational databases and NoSQL databases.
4. Demonstrate sufficient knowledge and skills on installing, configuring and managing distributed data management frameworks.

## **Important Statements**

### **Submission Information**

- Present any written aspects of the assessment using font size 11 and using 1.5 spacing to allow for comments and annotations to be added by the markers.
- Complete the appropriate cover sheet for this assessment and append your work.
- Submit this coursework assessment task via Moodle.

### **Late Submission**

Assessments must be submitted in the format specified in the assessment task, by the deadline and to the submission point published on Moodle. Failure to submit by the published deadline will result in penalties which are set out in Section 6 of the Academic Regulations, available at:

<https://icity.bcu.ac.uk/Quality-Enhancement-and-Inclusion/Quality-Assurance-and-Enhancement/Academic-Regulations>

### **Use of Artificial Intelligence**

Whilst AI tools can be helpful in assisting learning, when it comes to assessment, the Academic Misconduct Procedure is clear that this should be a student's own original work and not the work of other people or AI tools.

The [Use of AI Tools – Student Guidelines](#) document follows the same guidelines your lecturers use. If you are unsure of whether AI is appropriate within your work, please read the guidelines or ask your lecturer. For advice and guidance around academic writing, please visit the [Centre for Academic Success](#).

### **Academic Integrity Guidance**

Academic integrity is the attitude of approaching your academic work honestly, by completing and submitting your own original work, attributing and acknowledging your sources when necessary. Understanding good academic practice in written and oral work is a key element of academic integrity. It is a positive aspect of joining an academic community, showing familiarity with and acknowledging sources of evidence. The skills you require at higher education may differ from those learned elsewhere such as school or college.

You will be required to follow specific academic conventions which include acknowledging the work of others through appropriate referencing and citation as explicitly as possible. If you include ideas or quotations that have not been appropriately acknowledged, this may be seen as plagiarism which is a form of academic misconduct. If you require support around referencing, please contact the [Centre for Academic Success](#)

It is important to recognise that seeking out learning around academic integrity will help reduce the risk of misconduct in your work. Skills such as paraphrasing, referencing and

citation are integral to acting with integrity and you can develop and advance these key academic skills through the [Centre for Academic Success \(CAS\)](#).

To learn more about academic integrity and its importance at university, you can access CAS resources on Moodle. Furthermore, you can book on to workshops and request 1-2-1 support around key academic skills.

### **Academic Misconduct**

Academic misconduct is conduct that has or may have the effect of providing you with an unfair advantage by relying on dishonest means to gain advantage and which therefore compromises your academic integrity.

The Academic Misconduct procedure sets out the process we will follow, and the penalties we may apply, in cases where we believe you may have compromised your academic integrity by committing academic misconduct. The Academic Misconduct Procedure and information about academic support is available at: <https://icity.bcu.ac.uk/Student-Affairs/Appeals-and-Resolutions/Academic-Misconduct-Procedure>

## **Assessment Details**

**Title:** IoTThings Application Report

**Style:** Report based on Implementation

**Rationale:** Writing professional level reports is a common task in many organisations. It is not good enough to be an excellent programmer, as clear communication skills are also a prerequisite in many of today's organisations.

**Description:**

The assignment for this module is about creating a MongoDB NoSQL database for IoTThings, a start-up business for home automation solutions based in the UK. The SME installs sensors to automate homes and use MQTT (MQ Telemetry Transport) messages to collect sensors activation data and store it in a MongoDB database for data analysis. The collected data is used to predict activities, provide recommendation and to ensure the safety of the home and its occupants (e.g., using smart door locks, automated blind shutters, controlling lights & light switches, adjust the temperature of the house according to owner preferences, send notification when a smoke alarm is triggered, ...etc).

The current database consists of an ERP (Enterprise Resource Planning), CRM (Customer Relationship Management), Financial, Order Processing/Sales and Logistic. However, IoTThings wants to add a new NoSQL core database to extend their current computer systems and to incorporate a new sensors activation data store with a final goal to provide feedback to their users about device usage. IoTThings is also concerned about the security of their data and have heard that it is better to have some 'three cluster' MongoDB database system and they want you as a consultant data scientist/ programmer/analyst to design and implement such a system, but in the first instance they want you to focus on designing just the sensors database.

In addition, the company wants to build a simple NodeJS server to handle received MQTT messages and store data in the MongoDB NoSQL database. Also, IoTThings is keen to implement an API for accessing and processing the stored data.

In addition to creating a MongoDB system you must also produce a report that provides IoTThings with an overview of the principal types of NoSQL databases and explain what the benefits and drawbacks of each type from a theoretical basis. Don't make this part of your report too long, but it must have enough information for them to invest their cash into the new database, and to pay your consultancy bill. You have been given a hint that they know little or nothing about NoSQL databases, other than they seem a good idea.

You must also include in your report a section where you critically compare, analyse and evaluate the relational database approach with a key-value document store database (like MongoDB). Make this section generic just in case after seeing your MongoDB database they decide to go with another software provider.

Finally, you need to include in the report your MongoDB design and implementation in terms of screenshots, installation and configuration including your data management system.

**Recommended structure of your report for IoTThings:**

1. Coversheet – don't forget to put your name on your report. I would also recommend putting on the month and year you submit your report to Moodle.
2. Index
3. Introduction
4. Types of NoSQL databases – include some theory to provide an overview of each type of NoSQL databases.
5. Comparison of Relational and NoSQL databases (do not forget to critically compare, analysis and evaluate the differences between Relational and NoSQL databases. Remember NoSQL is an extension of SQL – make sure the readers of your report understand this.)
6. IoTThings NoSQL database design and implementation
7. API implementation and documentation to provide access to stored data
8. Summary and Conclusion (In this section highlight why IoTThings should invest in implementing the NoSQL database system for their marketing database. Include a final section on possible future work, such as building a customer front-end to visualise stored sensors data.

In your appendices, other than your references, you will need to include information pertaining to the datasets used to evaluate your installation. You need to provide an overview of the data that you have used for testing your implementation, queries and data storage solution, including data used to demonstrate distributed data management solution and CRUD provision. This part will make sense as you work through the lab exercises. The total word count for your report should be around 4,000. Do not forget to put in references in sections 4 and 5. Do not forget page numbers and do make sure that your screenshots are readable.

This is a professional report and of the type you might have to produce as a consultant data scientist/programmer/analyst. It needs to be of a professional standard. Hence, it must look good and read well.

IoT Things will not give you their datasets because it is protected by UK GDPR. Hence, for this report you will build your own datasets through lab exercises and other open-source datasets. You know that you will need a dataset of sensors activation. This will require you to build on your knowledge of datasets.

**Additional information:**

For advice on writing style, referencing and academic skills, please make use of the Centre for Academic Success: <https://icity.bcu.ac.uk/celt/centre-for-academic-success>

**Workload:**

This assessment has a word count of 4,000 words and a typical student would be expected to take 40 hours to pass this assessment.

**Transferable skills:**

Key transferable skills embedded in this assessment include gaining excellent written communication skills and technical report writing to a professional standard.

**Marking Criteria:**

**Table of Assessment Criteria and Associated Grading Criteria**

<b>Learning Outcomes</b>	1 Appraise and effectively communicate the different principal types, theories and technologies associated with NoSQL databases.	2 Critically compare, analyse and evaluate traditional Relational databases and NoSQL databases.	4 Demonstrate sufficient knowledge and skills on installing, configuring and managing distributed data management frameworks.
<b>Assessment Criteria</b> →			
<b>Weighting:</b>	20%	20%	20%
<b>Grading Criteria</b>  0 – 29% F	Little or no mention of types of NoSQL databases or associated theories	No or limited section pertaining to this learning outcome has been included in the report.	Little knowledge or skills on installing, configuring and managing a distributed data management framework was presented in the report.
<b>30 – 39% E</b>	Some mention of types of NoSQL but no details or associated theories	A limited attempt to critically compare traditional Relational databases and NoSQL databases has been made but lacks detail.	Limited knowledge or skills on installing, configuring and managing a distributed data management framework was presented in the report.

	<b>40 – 49% D</b>	A range of NoSQL databases have been described but in limited detail. No associated theory has been included.	An attempt has been made to critically compare, analyse and evaluate traditional Relational databases and NoSQL databases but only at a superficial level.	A working knowledge and some skills on installing, configuring and managing a distributed data management framework were presented in the report.
	<b>50 – 59% C</b>	Some NoSQL databases have been described in detail and limited associated theory has been included.	An acceptable attempt has been made to critically compare and analyse traditional Relational databases and NoSQL databases. However, there has been no attempt to evaluate the differences between the two database systems.	A good working knowledge and some skills on installing, configuring and managing a distributed data management framework were presented in the report.
	<b>60 – 69% B</b>	A range of different NoSQL databases have been described in some detail and associated theory has been included.	A good attempt has been made to critically compare traditional Relational databases and NoSQL databases. However, there has been a limited attempt analysing and evaluating the differences between the two database systems.	A working knowledge and some skills on installing a NoSQL database was presented. There was limited evidence that the student could configure and manage a distributed data database system.



	<b>70 – 79% A</b>	A range of different NoSQL databases have been described in good detail. Relevant and appropriate theory has been included.	A good attempt has been made to critically compare traditional Relational databases and NoSQL databases. However, there has been a good attempt at analysing and evaluating the differences between the two database systems.	A good knowledge and evidence of skills pertaining to installing a NoSQL database was presented. There was good evidence that the student could configure and manage a distributed data database system.	
	<b>80 – 89% A+</b>	A range across all types of NoSQL databases have been described in good detail Relevant and appropriate theory associated with each type of NoSQL databases has been included.	An excellent approach has been adopted in a critical comparison of traditional Relational databases and NoSQL databases. Thorough analysis of each data bases system was presented in the report, which led to an excellent evaluation of differences between the two database systems.	Excellent evidence of a working knowledge and skills pertaining to installing a NoSQL database was presented. There was good evidence that the student could configure and create and manage a distributed data database system.	



	<b>90 – 100% A*</b>	All types of NoSQL databases have been described in excellent and precise detail. Relevant and appropriate theory associated with each type of NoSQL databases has been included.	An excellent approach has been adopted in a critical comparison of traditional Relational databases and NoSQL databases and presented to a professional standard. Through analysing each database system, an excellent evaluation of differences between the two database systems has been presented.	A professional level working knowledge and skills pertaining to installing a NoSQL database was presented. There was excellent evidence that the student could configure and create and manage a commercial, distributed data database system.	
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**Format:** PDF document uploaded to the module's Moodle site.

### Regulations:

- The minimum pass mark for a module is 40%
- Re-sit marks are capped at 40%

*Full academic regulations are available for download using the link provided above in the IMPORTANT STATEMENTS section*

### Late Penalties

If you submit an assessment late at the first attempt, then you will be subject to one of the following penalties:

- if the submission is made **between 1 and 24 hours** after the published deadline the original mark awarded will be reduced by **5%**. For example, a mark

of 60% will be reduced by 3% so that the mark that the student will receive is 57%.

- if the submission is made between **24 hours** and **one week (5 working days)** after the published deadline the original mark awarded will be reduced by 10%. For example, a mark of 60% will be reduced by 6% so that the mark the student will receive is 54%.
- **if the submission is made after 5 days following the deadline, your work will be deemed as a fail and returned to you unmarked.**

The reduction in the mark will not be applied in the following two cases:

- the mark is below the pass mark for the assessment. In this case the mark achieved by the student will stand
- where a deduction will reduce the mark from a pass to a fail. In this case the mark awarded will be the threshold (i.e., 40%)

Please note:

- **If you submit a re-assessment late then it will be deemed as a fail and returned to you unmarked.**

#### **Feedback:**

Marks and Feedback on your work will normally be provided within 20 working days of the submission deadline.

#### **Where to get help:**

Students can get additional support from the library support for searching for information and finding academic sources. See their iCity page for more information:

<http://libanswers.bcu.ac.uk/>

The Centre for Academic Success offers 1:1 advice and feedback on academic writing, referencing, study skills and maths/statistics/computing. See their iCity page for more information: <https://icity.bcu.ac.uk/celt/centre-for-academic-success>

Additional assignment advice can be found here: <https://libguides.bcu.ac.uk/MA>

#### **Fit to Submit:**

Are you ready to submit your assignment? Review this assignment brief and consider whether you have met the criteria. Use any checklists provided to ensure that you have done everything needed.