## AQA Logo

## 2017 Project log

## A-level Computer Science (7517)

## Computing Practical Project (7517/C)

Please attach a copy of this form securely to the front your candidate’s work.

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| **Centre number** |  | **Centre name** |
| 20570 |  | King Edward VI College, Stourbridge |
|  |  |  |

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| --- | --- | --- |
| **Candidate number** |  | **Candidate’s full name** |
| 187344 |  | Talha Arslan Tariq |
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**Section one - the project**

To be completed by the candidate and returned to the teacher for approval before the project is started

|  |  |
| --- | --- |
| Project title | Online Multiplayer Ultimate Tic Tac Toe with AI |
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| --- | --- | --- |
| Project type | | problem |
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| A game of Ultimate Tic Tac Toe, which can be played online with other players, multiplayer on the same computer (co-op), and with AI, using the monte-carlo tree search algorithm. |

To be completed by the teacher:

From the given description the project is at a standard required for A-level Yes/No

**Section two – project assessment**

To be completed by the teacher

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| --- | --- | --- | --- |
| **Analysis** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 3 | Fully or nearly fully scoped analysis of a real problem, presented in a way that a third party can understand.  Requirements fully documented in a set of measurable and appropriate specific objectives, covering all required functionality of the solution or areas of investigation.  Requirements arrived at by considering, through dialogue, the needs of the intended users of the system, or recipients of the outcomes for investigative projects.  Problem sufficiently well modelled to be of use in subsequent stages. | 7-9 | I believe my Analysis section should get 9/9 marks for the following reasons:   * I have fully detailed an analysis of the problems associated with playing Ultimate Tic Tac Toe in my Introduction section. * My entire section has been deliberately written and explained in great detail to ensure that any third-party reader can understand what is being said. * I have numerous objectives which have been well explained and broken down into mini objectives. * All of my objectives are measurable and appropriate. * I have covered all aspects of my project’s functionality in my analysis. * I have considered the needs of the end users by researching the positives and negatives of similar games, building on the positives and ensuring that the negatives don’t occur in my project. * My project has been modelled to a high standard since I have demonstrated the entirety of the AI being implemented in a simpler, Tic Tac Toe game as opposed to the Ultimate variant. * Furthermore my AI model works successfully and well since it almost always chooses either a corner position or the centre position, which are the strongest in the game. |
| 2 | Well scoped analysis (but with some omissions that are not serious enough to undermine later design) of a real problem.  Most, but not all, requirements documented in a set of, in the main, measurable and appropriate specific objectives that cover most of the required functionality of a solution or areas of investigation.  Requirements arrived at, in the main, by considering, through dialogue, the needs of the intended users of the system, or recipients of the outcomes for investigative projects.  Problem sufficiently well modelled to be of use in subsequent stages. | 4-6 |
| 1 | Partly scoped analysis of a problem.  Requirements partly documented in a set of specific objectives, not all of which are measurable or appropriate for developing a solution. The required functionality or areas of investigation are only partly addressed.  Some attempt to consider, through dialogue, the needs of the intended users of the system, or recipients of the outcomes for investigative projects.  Problem partly modelled and of some use in subsequent stages. | 1-3 |
|  | No evidence presented | 0 | **Mark awarded:** |

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| **Documented design** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 4 | Fully or nearly fully articulated design for a real problem, that describes how all or almost all of the key aspects of the solution/investigation are to be structured/are structured. | 10-12 |  |
| 3 | Adequately articulated design for a real problem that describes how most of the key aspects of the solution/investigation are to be structured/are structured. | 7-9 |
| 2 | Partially articulated design for a real problem that describes how some aspects of the solution/investigation are to be structured/are structured. | 4-6 |
| 1 | Inadequate articulation of the design of the solution so that it is difficult to obtain a picture of how the solution/investigation is to be structured/is structured without resorting to looking directly at the programmed solution. | 1-3 |
|  | No evidence presented | 0 | **Mark awarded:** |

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| **Technical solution – completeness** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 3 | A system that meets almost all of the requirements of a solution/an investigation (ignoring any requirements that go beyond the demands of A-level). | 11-15 |  |
| 2 | A system that achieves many of the requirements but not all. The marks at the top end of the band are for systems that include some of the most important requirements. | 6-10 |
| 1 | A system that tackles some aspects of the problem or investigation. | 1-5 |
|  | No evidence presented | 0 | **Mark awarded:** |

**NOTES:**

Completeness is not only about how well a solution meets the objectives set by the student but also what an expected technical solution might perform for this particular project.

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| **Technical solution – techniques used** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 3 | The techniques used are appropriate and demonstrate a level of technical skill equivalent to those listed in Group A in **Table 1**.  Program(s) demonstrate(s) that the skill required for this level has been applied sufficiently to demonstrate proficiency. | 19-27 |  |
| 2 | The techniques used are appropriate and demonstrate a level of technical skill equivalent to those listed in Group B in **Table 1**.  Program(s) demonstrate(s) that the skill required for this level has been applied sufficiently to demonstrate proficiency. | 10-18 |
| 1 | The techniques used demonstrate a level of technical skill equivalent to those listed in Group C in **Table 1**.  Program(s) demonstrate(s) that the skill required for this level has been applied sufficiently to demonstrate proficiency. | 1-9 |
|  | No evidence presented | 0 | **Mark awarded:** |

**NOTES:**

The mark to be awarded, within the level, should be decided upon using these factors:

1. The extent to which the criteria for the level have been achieved
2. The quality of the coding style that the student has demonstrated
3. The effectiveness of the solution.

It would be beneficial for these to also be referred to in the comments/evidence section.

Table 1 referred to is on pages 95-96 of the specification (version 1.4 December 2016)

Continue on a separate sheet if necessary

|  |  |  |  |
| --- | --- | --- | --- |
| **Testing** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 4 | Clear evidence, in the form of carefully selected representative samples, that thorough testing has been carried out. This demonstrates the robustness of the complete or nearly complete solution/thoroughness of investigation and that the requirements of the solution/investigation have been achieved. | 7-8 | No useful evidence has been presented. Screenshots are unclear and not explained. |
| 3 | Extensive testing has been carried out, but the evidence presented in the form of representative samples does not make clear that all of the core requirements of the solution/investigation have been achieved. This may be due to some key aspects not being tested or because the evidence is not always presented clearly. | 5-6 |
| 2 | Evidence in the form of representative samples of moderately extensive testing, but falling short of demonstrating that the requirements of the solution/investigation have been achieved and the solution is robust/investigation thorough.  The evidence presented is explained. | 3-4 |
| 1 | A small number of tests have been carried out, which demonstrate that some parts of the solution work/some outcomes of the investigation are achieved.  The evidence presented may not be entirely clear. | 1-2 |
|  | No evidence presented | 0 | **Mark awarded:0** |

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| **Evaluation** | | | |
| **Level** | **Criteria** | **Mark** | **Comments/evidence** |
| 4 | Full consideration given to how well the outcome meets all of its requirements.  How the outcome could be improved if the problem was revisited is discussed and given detailed consideration.  Independent feedback obtained of a useful and realistic nature, evaluated and discussed in a meaningful way. | 4 |  |
| 3 | Full or nearly full consideration given to how well the outcome meets all of its requirements.  How the outcome could be improved if the problem was revisited is discussed but consideration given is limited.  Independent feedback obtained of a useful and realistic nature but is not evaluated and discussed in a meaningful way, if at all. | 3 |
| 2 | The outcome is discussed but not all aspects are fully addressed either by omission or because some of the requirements have not been met and those requirements not met have been ignored in the evaluation.  No independent feedback obtained or if obtained is not sufficiently useful or realistic to be evaluated in a meaningfully way even if attempted. | 2 |
| 1 | Some of the outcomes are assessed but only in a superficial way.  No independent feedback obtained or if obtained is so basic as to be not worthy of evaluation. | 1 |
|  | No evidence presented | 0 | **Mark awarded:** |

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| **Total mark /75** |
| **Concluding comments:** |
| **Signed: Date:** |

**4.14.3.4 Example technical skills**

**4.14.3.4.1 Table 1: Example technical skills**

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| **Group** | **Model (including data model/structure)** | **Algorithms** |
| A | * Complex data model in database (eg several interlinked tables) * Hash tables, lists, stacks, queues, graphs, trees or structures of equivalent standard * Files(s) organised for direct access * Complex scientific/mathematical/robotics/ control/business model * Complex user-defined use of objectorientated programming (OOP) model, eg classes, inheritance, composition, polymorphism, interfaces * Complex client-server model | * Cross-table parameterised SQL * Aggregate SQL functions * User/CASE-generated DDL script * Graph/Tree Traversal * List operations * Linked list maintenance * Stack/Queue Operations * Hashing * Advanced matrix operations * Recursive algorithms * Complex user-defined algorithms (eg optimisation, minimisation, scheduling, pattern matching) or equivalent difficulty * Mergesort or similarly efficient sort * Dynamic generation of objects based on complex user-defined use of OOP model * Server-side scripting using request and response objects and server-side extensions for a complex client-server model * Calling parameterised Web service APIs and parsing JSON/XML to service a complex client-server model |
| B | * Simple data model in database (eg two or three interlinked tables) * Multi-dimensional arrays * Dictionaries * Records * Text files File(s) organised for sequential access * Simple scientific/mathematical /robotics/ control/business model * Simple OOP model * Simple client-server model | * Single Table or non-parameterised SQL * Bubble sort Binary search * Writing and reading from files * Simple user defined algorithms (eg a range of mathematical / statistical calculations) * Generation of objects based on simple OOP model * Server-side scripting using request and response objects and server-side extensions for a simple client-server model * Calling Web service APIs and parsing JSON/ XML to service a simple client-server mode |
| C | * Single-dimensional arrays * Appropriate choice of simple data types * Single table database | * Linear search * Simple mathematical calculations (eg average) * Non-SQL table access |

**4.14.3.4.2 Table 2: Coding styles**

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| --- | --- |
| Style | Characteristic |
| Excellent | * Modules (subroutines) with appropriate interfaces * Loosely coupled modules (subroutines) – module code interacts with other parts of the program through its interface only * Cohesive modules (subroutines) – module code does just one thing * Modules(collections of subroutines) – subroutines with common purpose grouped * Defensive programming * Good exception handling |
| Good | * Well-designed user interface * Modularisation of code * Good use of local variables * Minimal use of global variables * Managed casting of types * Use of constants * Appropriate indentation * Self-documenting code * Consistent style throughout * File paths parameterised |
| Basic | * Meaningful identifier names * Annotation used effectively where required |