**Project Specification**

**Assembly Programming**

**KW\_KCCGD\_B**

**Total Marks**: 100, **Weight:** 30%

**Project Overview**

Create a simple calculator program in 68000 Assembly that can perform basic arithmetic operations (addition, subtraction, multiplication, and division) based on user input. The program should:

1. Prompt the user to enter two numbers.
2. Prompt the user to select an operation (+, -, \*, /).
3. Perform the selected operation on the two numbers.
4. Display the result on the screen.

Features:

1. Input Handling:
   1. Use TRAP #15 to read numbers and operation choices from the user.
2. Arithmetic Operations:
   1. Implement addition, subtraction, multiplication, and division using 68000 instructions.
3. Output:
   1. Display the result of the operation on the screen.
4. Error Handling:
   1. Handle invalid inputs (e.g., division by zero or invalid operation choices).

Optional: you can extend your project with additional arithmetic operations.

**Submission**

You are required to upload an electronic copy (a pdf) of your project report (**2-3 pages: minimum 2 pages**), a PPT for the presentation (**max 5 slides**), and source code (68000 assembly language; use Easy68K for coding) to Turnitin (an upload link will be provided at Blackboard). All files (a zip file) can be submitted before **5PM on the 9th of April 2024**. There will be no extension. **Only one member of the group is required to upload the zip file.**

For the project report IEEE referencing style must be used; Microsoft Word and LATEX templates are available at:

<http://www.ieee.org/conferences_events/conferences/publishing/templates.html>

**Formation of Group**

A group can have up to 3 students. In the end of the report, include the table shown explaining contributions of each group member to the project. If you carry out this project individually, you do not need to attach this table.

|  |  |  |
| --- | --- | --- |
|  | Topic | % Contribution |
| Student 1 |  |  |
| Student 2 |  |  |
| Student 3 |  |  |

**Project Report**

You are required to produce a report that describes your 68000 Assembly project. You should explain as clearly as possible the project and code. You are required to include an instruction set that you have used for developing the project. You should add comments to each of the instructions. You should describe each component of the project clearly. You also need to explain and justify how well this project would work in reality. You should explain how you want to improve the project and what changes you want to make to the existing solution.

The report should have the following sections:

Section 1: Introduction to Project,

Section 2: Project Description,

Section 3: Explanation of Codes,

Section 4: Results / Output of the Project, and

Section 5: Conclusions.

You should write each section as clearly as possible. If needed, you can include figures, tables etc. in the report.

**Presentation**

The presentation should not exceed **4-5 minutes** in length. This should illustrate the key parts of the project.

Date and Time: **10th April** and **1-3 PM**

Room: **A313**

**Weekly Progress:**

You should demonstrate your progress (e.g. code developed) on the project each week starting from week 9 (20th March) during the lab hours.

Week 9: 20th March

Week 10: 27th March

Week 11: 3rd April

**Marking (100%; weight: 0.30)**

**Progress and activities (10%)**

Progress and activities on Week 9 (20th March): 3%

Progress and activities on Week 10 (27th March): 3%

Progress and activities on Week 11 (3rd April): 4%

**Report and Project (60%)**

Section 1 Introduction to Project (5%)

Section 2 Project Description (10%),

Section 3: Explanation of Project codes and Implementation (30%)

Section 4: Results / Output of the Project (10%)

Section 5: Conclusions (5%)

The report and project will be assessed based on the Marking Rubrics below.

**Presentation (30%)**

The presentation will be assessed based on the third row of the table below (i.e. Marking Rubrics).

**Marking Rubrics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 90-100 | 70-90 | 60-70 | 50-60 | 40-50 | 0-40 |
| **Progress and Activities (10%**) | Outstanding progress on project and excellent activities | Very good progress on project and great activities | Good progress on project and above-average activities. | Satisfactory progress on the project and average activities. | Moderate progress on the project and limited activities. | Inadequate progress on the project and no / little activities. |
| **Report and Project (60%)** | Very challenging project objectives are well presented, met and thoroughly motivated as well as discussed.  Exceptionally well written, and presented, with no mistakes in formatting or referencing. | Challenging project objectives are well presented, met and thoroughly motivated as well as discussed.  Well written, with no (large) language errors. All figures are well conceived and readable. The IEEE template is adhered to. Report does not exceed the length limits. References are appropriately and correctly used. | Appropriate project objectives are well presented, met and thoroughly motivated as well as discussed.  Main document has a few languages and/or style errors. Figures are well presented. IEEE template and length limit are adhered to. References are complete, and correctly used. | Appropriate project objectives are presented, mostly met and motivated as well as discussed.  Main document is readable with some language and/or style errors. Some figures are mostly well presented. IEEE template is largely adhered to. References are mostly complete and correctly used. | There are clear objectives, which are at least partially met.  Main document is readable with some language and/or style errors. Some figures may be hard to read or presented in a suboptimal manner. IEEE template is largely adhered to. References are mostly complete and correctly used. | Cannot discern project objective, and/or if project objectives were met.  Littered with typos, and/or poor use of English. IEEE template may have been broken. Figures may be hard to read. References (if any) are probably incomplete. |
| **Presentation (30%)** | A very well-conceived presentation demonstrating all key functionality and the execution of key methodological aspects. | A well-conceived presentation demonstrating key functionality and the execution of key methodological aspects. | A well-conceived presentation demonstrating essential functionality and the execution of key methodological aspects. | A well-conceived presentation demonstrating some essential functionality and the execution of key methodological aspects. | A presentation shows a functioning methodology. However, the it is poorly conceived and/or lacks some depth. | It does not clearly illustrate key aspects of the project. |

**Possible sources where you can find different 68000 assembly language projects include, but are not limited to:**

* <https://mrjester.hapisan.com/04_MC68/>
* <https://smartbrains6.com/category/projects/assembly-language-projects/>
* <https://simpledevcode.wordpress.com/2016/12/15/mini-guide-to-68000-assembly-programming/>
* <https://github.com/topics/assembly-project>
* <https://github.com/yousefkotp/8086-Assembly-Projects>
* http://www.easy68k.com/