ICS3U0 Final Culminating Activity

Brief Description of the Project

You may choose EITHER of the following projects:

1. Use Visual Basic to ***create your own software***. The ***main objectives*** of this activity are as follows:

- ***Bring together***, in one piece of software, many of the ***main ideas of software development and problem solving*** that you have learned in ICS3U0
- Use the "Match-A-Face-O-Rama" example matching game to learn a few ***new ideas*** that you will use in your project
- ***Conduct research*** to include features that involve ideas not covered in ICS3U0

OR

2. Write a research report on one of the following topics in computer science:

- The Power of Binary: How binary numbers are used to encode information.
  Your report should describe various methods of encoding information in binary. In addition, it should address the question of why the binary number system, and not some other system, is used in digital devices.
- Big Data
- Artificial Intelligence
- Computational and Synthetic Biology
- Computer Graphics, Vision, Animation and Game Science
- Machine Learning
- Robotics
- Cryptography
- Any other topic approved by the teacher

Main Ideas in ICS3U0

- **Computer as a Data Processing Machine:** INPUT → PROCESSING → OUTPUT
  ↕
  MEMORY
- **Data Types:** Numeric, String, Logical
- **Comments:** Used to explain code that is difficult to understand and to introduce major sections of code
- **Variables:** Used whenever a program needs to "remember" a piece of information.
- **Constants:** Names used to represent constant values → improve program readability, facilitate easier modifications
- **Components (in App Inventor), Objects/Controls (in VB), Properties, Methods, Events**
- **Making Decisions/Selections:** "If" Statements
- **Repeating Statements:** "Loops" → Counted ("For" Loops), Conditional ("While" Loops)
- **Operations:** +, −, *, /, ^, Mod, etc.
- **Procedures:** Event Handlers, General Procedures, Parameters/Arguments
- **Lists in App Inventor**

New Ideas found in Match-A-Face-O-Rama

- Generating Pseudorandom Numbers in VB
- Arrays in VB (similar to lists in App Inventor but cannot change size while program is running)
- Lists in VB
- Using Arrays to Generate Pseudorandom Integers without Repetition
- Using "My.Resources" in VB
- Playing Sounds in VB
- Creating Software in VB that uses more than One Form
- Using a Single Event Handler for multiple Objects
- Using "Timer" Controls in VB (called "Clock" components in App Inventor)

Overview of Evaluation

A detailed evaluation scheme is included at the end of this document. The following are the main criteria that will be used to judge the quality of your software:

- The level of ***difficulty*** of the project
- The thoroughness of the ***design process*** used
- The extent to which the ***main ideas*** learned in ICS3U0 are used
- The extent to which ***new ideas*** found in the "Match-A-Face-O-Rama" example are used
- The extent to which ***ideas not encountered at all*** in ICS3U0 are included
- The ***user-friendliness*** of the software
- The ***correctness*** of the code
- The ***efficiency*** of the code
- The ***readability*** of the code
- The ***organization*** of the code

Software Evaluation Guide

Categories	***Criteria***	***Descriptors***					***Mark***
		Level 4	**Level 3**	**Level 2**	**Level 1**	**Level R**	
Knowledge and Understanding (KU)	**Required Elements** ☐ At Least Three Text Boxes ☐ A Group of at Least Three Radio Buttons ☐ A Group of at Least Three Check Boxes ☐ At Least Three "If" Statements ☐ At Least Three "For…Next" Loops ☐ At Least Three Global Variables ☐ At Least Three Objects that Move in some Way ☐ At Least one Programmer-Defined Procedure with Parameters. ☐ Pseudo-Random Numbers	All Included	Most Included	Moderate Number Included	Minimal Number Included	Not Included	20
	Loops used Wherever Possible To what degree are repetitive steps implemented using counted or conditional loops?	Very High	High	Moderate	Minimal	Insuffic-ient	
Application (APP)	**Declaration of Variables** To what degree are the variables declared with appropriate data types?	Very High	High	Moderate	Minimal	Insuffic-ient	20
	Efficiency of Code To what degree has the student written code that is as efficient and compact as possible?	Very High	High	Moderate	Minimal	Insuffic-ient	
Thinking, Inquiry and Problem Solving (TIPS)	**Usefulness/Functionality of Required Elements** To what degree are the required elements relevant to the overall purpose of the software? To what extent are the required elements used in an appropriate manner?	Very High	High	Moderate	Minimal	Insuffic-ient	
	Inclusion of Elements not Explicitly Taught To what degree has the student included elements not covered explicitly in the course? How thoroughly were these features researched, understood and utilized in a relevant manner?	Very High	High	Moderate	Minimal	Insuffic-ient	20
Communication (COM)	**Indentation of Code** **Insertion of Blank Lines in Strategic Places** (to make code easier to read)	Very Few or no Errors	A Few Minor Errors	Moderate Number of Errors	Large Number of Errors	Very Large Number of Errors	
	Descriptiveness of Identifier Names Variables, Constants, Objects, Procedures, etc **Clarity of Code** How easy is it to understand, modify and debug the code? **Adherence to Naming Conventions**	Masterful	Good	Adequate	Passable	Insuffic-ient	20
	Comments Are comments used to explain code that might be hard to understand? Are comments clear and concise? Are comments used to introduce major blocks of code?	To a Great Extent	For the Most Part	To Some Extent	To a Minimal Extent	Very few or no Comments were Included	

Research Report Evaluation Guide

	Criteria	Descriptors					Mark
		Level 4	Level 3	Level 2	Level 1	Level R	
KU	**Understanding of _____ demonstrated by the Writer of the Report**	Extensive	Very Good	Good	Moderate	Insufficient	____ 20
	Depth of the Report (i.e. Is the discipline described in depth or only superficially?)	Extensive	Very Good	Good	Moderate	Insufficient	
APP	**Accuracy of the Description of the Discipline**	Very Accurate	Accurate	Moderately Accurate	Minimally Accurate	Completely Inaccurate	____ 20
TIPS	**Organization of Ideas**	Highly Logical	Very Logical	Moderately Logical	Somewhat Illogical but Passable	Highly Illogical	____ 10
COM	**Effectiveness of Introduction and Conclusion**	Extremely Effective	Very Effective	Moderately Effective	Not Very Effective but Passable	Highly Ineffective	____ 30
	Clarity (How effectively is the topic communicated to people who know little or nothing about it?)	Highly Clear	Very Clear	Moderately Clear	Somewhat Unclear but Passable	As Clear as Mud	
	Flow (Effectiveness of Linking Words and Phrases)	Masterful	Very Good	Good	Passable	Flows like Molasses	
	Spelling and Grammar	Masterful	Very Good	Good	Passable	Atrocious	
	Paragraph Structure and Content	Masterful	Very Good	Good	Passable	Atrocious	

Length of Report

- "Reasonable" Number of Pages, Double-Spaced
- One to Three Pages → Too Short
- Four to Seven Pages → Reasonable
- Seven to Ten Pages → Probably excessive but may be appropriate for certain topics
- Over Ten Pages → Too long for this kind of project