(V03) Software Engineering Team (ML | S | PS)

Description
Teams will collaborate on the engineering of a computer software application that performs tasks and operations as outlined in the provided topic. Project submissions will consist of software source code and assets in addition to a functional executable version of the application. Submissions will be judged on technical merit by software engineering professionals. Teams will be further required to formally present their project to a panel of judges via videoconference, and the presentation will be judged independently of the project's technical merits.

Eligibility
- Any Business Professionals of America student member may enter this event.
- A team will consist of 2-4 members.
- There are no restrictions on number of entries per chapter or per state.

Event Registration
- Advisors register members for the event using the Membership Registration System, accessible at https://register.bpa.org.
- The event can be added to your invoice using step 4, "Virtual Event Registration." Enter the name of each student into the "notes" field.
- Event registration can be purchased with your original invoice or with a new invoice after member registration.
- Registration deadline is no later than 11:59 p.m. Eastern Time, on November 15, 2021
- Members participating in competition must be registered for the event prior to submission deadline to be eligible.

Entry Fee
There will be a $20 fee for each team (*invoiced during registration*).

Topic
As a member of the startup game company, Cognitive Thought Media, you are tasked with creating an adventure game. The game may include, but is not limited to: upgradeable main characters, NPCs, villains, monsters, loot, equipment upgrades, levels or open worlds, etc. Your game may be 2D, 2.5D, or 3D, but will need to include at least one of the following capabilities:
- Single player (using AI)
- Multi Player (with or without AI)
- Network compatible

Competencies
- Apply technical skills in the given programming languages to develop the system of applications required.
- Evaluate and delegate responsibilities needed to perform required tasks as a team.
- Develop a project plan and timeline.
- Apply problem solving techniques.
- Implement system analysis and design concepts.
- Use internal programming documentation.
- Use object-oriented programming concepts and techniques.
- Demonstrate knowledge of how data is organized in software development.
- Apply programming concepts such as sequential file access, databases, and I/O operations.
- Use internal and external function and/or procedure calls.

Technical Specifications

Minimum functionality required:

- Interactive game environment
- Menu interface for non-gameplay user interaction (e.g. starting game, resuming game, choosing levels, exiting the game.)
- On-screen HUD for display of vital gameplay information
- Minimum average framerate of 30 frames-per-second (FPS)
- Serialization of game state to a database (see below) for saving and resumption of gameplay sessions.
- Values/stats of all game pieces/cards and related data must be stored on a database

Technology Requirements:

The following languages/frameworks are permitted:

- Java 6 or higher
- JavaScript
- Python 2.6+
- Ruby 1.8.6+
- Microsoft C#
- Objective-C / Cocoa
- C++
- Apple Swift
- Unity

Additional languages/frameworks/ may be approved by contacting the Director of Education, Patrick Schultz, at pschultz@bpa.org.

The following is a list of possible database systems available:

- Oracle Express 11g
- Microsoft SQL Server
- Oracle MySQL
- PostgreSQL
- SQLite
- JavaDB
- Google Firebase
- Amazon Web Services

Additional databases may be approved by contacting the Director of Education, Patrick Schultz, at pschultz@bpa.org.

The use of game development frameworks (e.g. Unity, XNA, pygame, cocos2d, et al.) is permitted if, and only if, the framework is freely available for educational or non-profit use. The use of paid proprietary development frameworks is expressly prohibited. Additionally, Realm Crafter and other "programming light" tools that provide a ready-made gaming engine and/or graphical assets are also prohibited. Any submission using a game development framework must clearly show the extent of original work done via source code comments.

Specifications

- The final project submission deadline will be January 15, 2022 at 11:59 p.m. Eastern Time.
- All project documents including, but *not* limited to: source code, game manual, project plan, resources, libraries, etc. must be packaged together in a compressed format and uploaded to a file sharing site (e.g. Dropbox, etc.).
- **Submit the URL to the final project files, Works Cited, and signed Release Form(s) in a combined PDF file to: https://virtual.bpa.org/submit, no later than 11:59 p.m. Eastern Time, on January 15, 2022.**
- The use integrated development environments (e.g. Microsoft Visual Studio, Eclipse, IntelliJ, Apple XCode, etc.…) is highly recommended.
- A signed Release Form shall be obtained by teams from any individual whose work, name, likeness or personal information is used as part of an event submission.
- Teams will be assigned to sections prior to their preliminary presentation.
- The Top 20 teams with the highest technical scores will be contacted to reserve a time for a videoconference presentation before a panel of judges. The dates and times for presentation reservations will be announced via e-mail notification.
- The top teams with the highest cumulative technical and presentation scores will be invited to attend the National Leadership Conference to be recognized for their outstanding efforts and to participate in the National Showcase.
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- Code must be original work of team.

NOTE ON FINAL PROJECT SUBMISSION

All project documents including, but *not* limited to: source code, game manual, project plan, resources, libraries, etc. must be packaged together in a compressed format and uploaded to a file sharing site (e.g. Dropbox, etc.). The project URL, Works Cited, and signed Release Form(s) (as a combined PDF file) are the only things that you will upload to **https://virtual.bpa.org/submit**. You must note the URL for your compressed project files, including any necessary login information, if applicable, in your combined PDF.

We strongly recommend that participants use integrated development environments (e.g. Microsoft Visual Studio, Eclipse, Oracle NetBeans, Apple XCode).

Method of evaluation

Application
Technical Judges' Rating Sheet
Presentation Judges' Rating Sheet

Length of event

No more than three (3) minutes set-up
No more than ten (10) minutes presentation time
No more than five (5) minutes judges' questions

NOTE TO MEMBERS

This is *not* an all or nothing event. You will be given credit for portions of the event you complete. You should therefore complete as many tasks as possible. You will be required to work as a team in order to complete all tasks. The presentation aspect of this contest will be done over Skype, iChat, or Google Hangouts so be prepared for a video conference style presentation.

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Judge Number _____ **Team Number _____**

Technical Scoring Rubric

Items To Evaluate	Below Average	Average	Good	Excellent	Points Awarded
Object-Oriented Programming (140 points)					
Proper class design and organization	1 – 3	4 – 15	16 – 27	28 – 40	
Code reuse (minimize code duplication)	1 – 2	3 – 10	11 – 18	19 – 30	
Use of encapsulation	1 – 2	3 – 10	11 – 18	19 – 30	
Use of inheritance	1 – 3	4 – 15	16 – 27	28 – 40	
Design Analysis (50 points)					
Data Flow Diagram(s)	1 – 4	5 – 20	21 – 36	37 – 50	
Code Documentation (70 points)					
Comment blocks explaining classes, methods and complex sections of logic	1 – 4	5 – 20	21 – 36	37 – 40	
Provide an in-game tutorial or walkthrough for instructional purposes	1 – 3	4 – 15	16 – 27	28 – 30	

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Items To Evaluate	Below Average	Average	Good	Excellent	Points Awarded
Crash Reporting (50 points)					
Generation of crash reports (via text file or dialog box) on application failure	1 – 3	4 – 15	16 – 27	28 – 30	
Option to e-mail crash report on application failure	1 – 2	3 – 10	11 – 18	19 – 20	
Data Driven Design (90 points)					
Application makes use of data driven design for runtime settings via database	1 – 3	4 – 15	16 – 27	28 – 30	
Session data (saved games, high scores, etc.) are stored via database for later reuse	1 – 3	4 – 15	16 – 27	28 – 30	
Application makes use of data driven design for game content via database	1 – 3	4 – 15	16 – 27	28 – 30	
Error Handling (65 points)					
Proper use of error handling techniques	1 – 2	3 – 10	11 – 18	19 – 20	
Proper use of exception handling techniques	1 – 2	3 – 10	11 – 18	19 – 20	
Clear user alerts on recoverable and non-recoverable error conditions	1 – 3	4 – 10	11 – 20	21 – 25	
Logging (60 points)					
Log system events to dedicated text file for debugging	1 – 3	4 – 15	16 – 27	28 – 30	
Log system errors to dedicated text file	1 – 3	4 – 15	16 – 27	28 – 30	

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TECHNICAL SPECIFICATIONS (125 POINTS)

NOTE: Specification points are awarded once per team by the event proctor, *not* by individual judges. Teams will be awarded points for specifications in full or *not* at all, i.e., these are "all or nothing" point awards.

Evaluation Item		Points Awarded
Project submission includes a manual containing directions for compiling/building and explains the features of the submission	100	
Installer included for project application.	25	

GAMEPLAY SCORING (150 POINTS)

Items To Evaluate	Below Average	Average	Good	Excellent	Points Awarded
Interface Design	1 – 3	4 – 15	16 – 27	28 – 30	
Inclusion of Audio	1 – 3	4 – 15	16 – 27	28 – 30	
Logical Controls	1 – 3	4 – 15	16 – 27	28 – 30	
Amount of Content	1 – 3	4 – 15	16 – 27	28 – 30	
Lasting Appeal	1 – 3	4 – 15	16 – 27	28 – 30	

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Judge Number _____ **Team Number _____**

PRESENTATION SCORING (200 POINTS) (AVERAGED PER JUDGE)

Items To Evaluate	Below Average	Average	Good	Excellent	Points Awarded
Explain the design and development process from start to finish	1 – 5	6 – 10	11 – 15	16 – 20	
Explain the flow or data (game saves, high scores, etc.)	1 – 5	6 – 10	11 – 15	16 – 20	
Explain the design of game and game mechanics	1 – 5	6 – 10	11 – 15	16 – 20	
Explain the use and design of media elements (sounds, graphics, etc.)	1 – 5	6 – 10	11 – 15	16 – 20	
Explain the software engineering principles utilized	1 – 5	6 – 10	11 – 15	16 – 20	
Explain how the game is innovative	1 – 5	6 – 10	11 – 15	16 – 20	
Team offered clear and direct responses to interview questions	1 – 5	6 – 10	11 – 15	16 – 20	
Demonstrate the entire team's role in the development of the game	1 – 5	6 – 10	11 – 15	16 – 20	
Presentation quality and style	1 – 5	6 – 10	11 – 15	16 – 20	
Presentation lasted no more than 10 minutes	1 – 5	6 – 10	11 – 15	16 – 20	

EVENT SCORING TOTALS

NOTE: Technical specification points are awarded once per team by the event proctor, *not* by individual judges. Final Project Preview, Technical, Gameplay, and Presentation points are awarded by the average judge score for that category.

Scoring Category		Points Awarded
Technical Scoring Points	525	
Technical Specifications Points	125	
Gameplay Points	150	
Presentation Points	200	
TOTAL (1,000 points maximum)		