# Project Statement of Work (SOW)

## Statement of Work (SOW) Template for Socket Programming Project

### Project Title:

Tic Tac Toe - Multiplayer

### Team:

Cubeland

Members: Ethan Fantl, Nathan Bennick.

### Project Objective:

The goal of the project is to pursue a deeper understanding of socket programming, internet protocols, internet security, and packet manipulation by developing a multiplayer game of tic tac toe. We will also practice client and server connections and protocols through implementing a server for hosting the two clients (players) participating.

If we have the time, we would like to implement some sort of security protocol for the packets and the server to prevent any sort of attacks that could happen on our game.

### Scope:

#### Inclusions:

* Simple UI for a tic tac toe game
* Server script capable of handling multiple connections from clients
* A client script that is able to work in parallel with our game to send packets and data needed
* Logic for gameplay, rules, and game finishing logic

#### Exclusions:

* Any custom game rules/customizations. Just plain tic tac toe
* Security features if we don’t have time to finish

### Deliverables:

* Working python script for a game of tic tac toe. Including complete game logic, protections, and functions.
* Working Server Script
* Working Client script to run with our tic tac toe logic
* Clean documentation for our code

### Timeline:

#### Key Milestones:

* Completion of the tic tac toe game
* Creation of a server that can accept at least 2 connections
* Client creation that can send legible signals to server and receive
* Server being able to actually run tic tac toe
* Server being able to handle edge cases and gracefully handle errors

#### Task Breakdown:

* Completion of the tic tac toe Milestone tasks
  + This will require us to have a defined board and game rule logic implemented in a python script. This will include functions to ensure that moves are valid and reflected on the board.
  + We will also need functions defining player movements and options that they can take in tic tac toe, and finally end game conditions and checks to finish the game once either a player wins or a “cat-game” finish is reached.
* Creation of a server that can accept at least 2 connections Milestone tasks
  + Set up multi-threaded server
  + Connection Handling
  + Port and IP configuration
* Client creation that can send legible signals to server and receive Milestone tasks
  + Client Server Communication Protocol
  + Client User Interface
  + Connection Management
* Server being able to actually run tic tac toe Milestone tasks
  + Game Session Management
  + Synchronization
* Server being able to handle edge cases and gracefully handle errors Milestone tasks
  + Invalid Moves
  + Disconnections
  + Timeouts
  + Graceful Shutdowns

### Technical Requirements:

#### Hardware:

* 1 Network capable server
* 2 Network capable client devices

#### Software:

* Linux Operating System
* Wireshark
* Python
* Libraries
  + Socket
  + Select
  + asyncio
  + Threads
  + OS
  + Sys
  + Zx
  + Json
  + Logging
  + Tkiner
  + Unittest or pytest

### Assumptions:

* Knowledge of server IP
* Each machine is capable of running a networking protocol such as TCP

### Roles and Responsibilities:

* Role: Developer
  + Both members of the team shall hold the same role, developer, which will be responsible for the continuing cooperation with other team members, code development and planning.

### Communication Plan:

* Once weekly, outside of class, our team will meet to discuss current progress, and blockers, assign what work we will do this week, track our progress and discuss anything we feel needs to be heard or will help keep us on track.

### Additional Notes:

* N/A