**Network Programming (Net Centric Programming) – IT096IU**

**Term Project: Text-Based Clash Royale (TCR)**

**Instructor: Le Thanh Son**

**Objectives**

This project aims to:

* Provide students with hands-on experience in designing, prototyping, testing, and evaluating network-based applications.
* Enable practical implementation of TCP and UDP communication protocols at the programming level.
* Reinforce theoretical knowledge of networking and communication through practical application.

**Project Deliverables**

* Submit the complete source code and documentation via Blackboard before the due date.
* All files must be zipped and named using the following format: GroupXX\_project.zip (e.g., Group01\_project.zip).
* A demonstration session will be held at the end of the course. You will be required to run your program and answer questions related to your implementation.
* **Failure to participate in the demonstration will result in a zero grade for the project.**

**Due Date**

* **Submission Deadline:** Day of demo
* **Demo Session:** Group 1 🡪 25: Friday (theory session), Remainings: Saturday (lab session)

**Project Task: Text-Based Clash Royale (TCR)**

Clash Royale is a strategy game developed by Supercell, combining elements of collectible card games, tower defense, and multiplayer online battle arenas. In this project, you'll build a simplified, text-based version of the game.

* **Programming language:** Golang
* **Protocols:** TCP, UDP, or both can be used

**Game Versions**

**1. Simple TCR Rules**

* Two players connect to the server using a username and password.
* Each player has 3 towers: 1 King Tower and 2 Guard Towers (specs in Appendix).
* Players must destroy the 1st Guard Tower before attacking the 2nd Guard Tower or King Tower.
* Each player has 3 troops, randomly spawned from a defined list (see Appendix).
* All towers and troops have HP, ATK, and DEF values.
* **Damage Formula:**  
  **DMG = ATK\_A - DEF\_B (if ≥ 0); then HP\_B = HP\_B - DMG**
* Players take turns deploying troops to attack. If a troop destroys a tower in one turn, it can continue attacking.

**2. Enhanced TCR Rules**

* Adds **CRIT chance** to damage:  
  **DMG = ATK\_A or (ATK\_A \* 1.2 if CRIT) - DEF\_B (if ≥ 0); then HP\_B = HP\_B - DMG**
* No turns. The game lasts 3 minutes, during which players attack continuously.
* The winner is the one who:
  + Destroys the King Tower first, or
  + Destroys more towers than the opponent when time runs out.
* **EXP System:**
  + Win: 30 EXP
  + Draw: 10 EXP each
* **MANA System:**
  + Starts at 5, regenerates 1/sec, max is 10
  + Used to summon troops
* **Leveling System:**
  + EXP increases troop/tower stats by 10% per level
  + Required EXP increases by 10% each level
* Player data (EXP, troop/tower levels) and troop/tower specs must be stored in **JSON** files.

**Documentation Requirements**

* System Architecture
* Application PDU Description
* Sequence Diagram
* Deployment & Execution Instructions

**Appendix**

**Towers**

| **Type** | **HP** | **ATK** | **DEF** | **CRIT** | **EXP** |
| --- | --- | --- | --- | --- | --- |
| King Tower | 2000 | 500 | 300 | 10% | 200 |
| Guard Tower | 1000 | 300 | 100 | 5% | 100 |

**Troops**

| **Name** | **HP** | **ATK** | **DEF** | **MANA** | **EXP** | **Special** |
| --- | --- | --- | --- | --- | --- | --- |
| Pawn | 50 | 150 | 100 | 3 | 5 |  |
| Bishop | 100 | 200 | 150 | 4 | 10 |  |
| Rook | 250 | 200 | 200 | 5 | 25 |  |
| Knight | 200 | 300 | 150 | 5 | 25 |  |
| Prince | 500 | 400 | 300 | 6 | 50 |  |
| Queen | N/A | N/A | N/A | 5 | 30 | Heals the friendly tower with lowest HP by 300 |

Note: You are encouraged to modify or add more troops/towers for game balance.

**Grading Criteria (20% of Course Grade)**

| **Component** | **Points** |
| --- | --- |
| Simple TCR | 40 |
| Continuous Play | 10 |
| Mana System | 10 |
| Critical Damage Logic | 5 |
| Leveling System | 10 |
| Documentation | 20 |
| Bonus Features | 5 |