ENGF0034 Week 8

After the assessment is before the assessment

Introduction

- The assignment is to write a technical specification for a multi-player networked Pacman game
- The existing protocol is inefficient, insecure, and Python-specific
- The goal is to design a better protocol that can be implemented in any language
- There is no need to implement the protocol, but understanding the existing code may require adding print statements
- The game has been extended to allow players to compete and try to make ghosts attack each other

Pacman Game Modes

- **Client-Server Mode**: One player acts as a server, the other as a client
- Both players must use the same password to connect
- This mode is useful when players are on the same network or the server is publicly accessible
- **Two Clients, One Relay Server**: Both clients connect to a relay server, which passes messages between them
- This mode is helpful when players are behind firewalls or geographically distant

Game Logic and Terminology

- Each player's computer models its own Pacman and ghosts, even when on the remote screen
- Ghosts cannot travel through the tunnels
- Terminology:
- **LOCAL**: Game object on the local screen
- **AWAY**: Player's Pacman on the remote screen
- **REMOTE**: Game object on the remote screen that the AWAY Pacman can interact with
- **FOREIGN**: The other player's Pacman when it is on the local screen

Maze and Synchronization

- Each computer sends a copy of its maze at the game start
- The game ships with three mazes, selectable with the -m flag
- Each computer maintains two mazes in memory: **LOCAL** and **REMOTE**
- Synchronization is achieved by continuous updates about actions like Pacman and ghost movements, eating food, and game status changes

Pacman Interactions and Events

- When a Pacman moves to the remote screen (**AWAY**), it sends a "pacman arrived" message
- Updates about the **AWAY** Pacman's position, direction, and speed are sent continuously
- Eating food or power pills, whether **LOCAL** or **AWAY**, triggers an "eat" message to update the other computer
- Ghost update messages convey position, direction, speed, and mode (e.g., **FRIGHTEN**)
- Specific messages handle events like a **FOREIGN** Pacman eating a ghost or dying

Messages, Encoding, and Issues

- The existing protocol uses 13 different message types for various events and updates
- It employs TCP, verbose message names, and Python's pickle for encoding, leading to several issues
- **Issues with the Existing Protocol**:
- Python-specific encoding limits interoperability
- Pickle is vulnerable to malicious input
- The protocol is inefficient and inconsistent in its encoding
- Excessive messages are sent, leading to unnecessary network traffic
- Reliance on TCP only can introduce latency

Your Task and Marking Criteria

- **Task**: Design a new protocol that addresses the issues of the existing one
- The protocol can use TCP, UDP, or both, but must not directly use existing protocols
- Encoding should be either text-based or binary, not a mix
- The use of pickle, HTML, XML, JSON, or similar pre-packaged formats is prohibited
- All 12 existing message types must be accounted for in the new protocol
- The specification must detail any additional processing needed by the receiver
- Clarification on the existing protocol or game can be sought on Piazza
- **Marking Criteria**: Conciseness, correctness, unambiguity, completeness, and the use of examples

Detailed Marking Guidance

- The marking is **peer-based**, aiming to enhance understanding of specifications through feedback
- Focus on whether the protocol would work as intended and its clarity for implementation
- **Correctness** (10 marks): Assesses the protocol's ability to function without errors
- **Unambiguousness** (10 marks): Focuses on clarity for implementation, including message decoding and handling of TCP streams
- **Completeness** (10 marks): Evaluates if the specification covers all necessary aspects for interoperability
- Additional marks may be awarded for design elegance or deducted for excessive verbosity

Please ask your questions

11 questions
5 upvotes