Internship Report – Month 3

Week 1: Understanding the Game and Strategy Modeling

This week, we studied the **rules of the Stratego game**, including goal conditions and possible moves. Each player aims to reach their victory position or defeat the other by rank. We modeled these concepts in UPPAAL using **Timed Automata**, defining key variables like player positions, win conditions, and turn management.

Week 2: Creating Templates for Player Behavior

Separate **templates** were designed for Player1 and Player2. Each template included locations like `Idle`, `Move`, and `Win`, and used **synchronization channels** (`turn1!`, `turn2?`, `win1!`, etc.) to control transitions and interactions.

A shared `turn` variable was implemented to ensure only one player could act at a time, simulating a realistic turn-based strategy game.

Week 3: Decision Logic, Ranks, and Interaction Rules

During this phase, we implemented **decision logic**, rank-based comparison, and simultaneous move handling.

If players reached the same position, their ranks (`rank1`, `rank2`) were compared to decide the winner.

Boolean flags `p1ReadyToWin` and `p2ReadyToWin` ensured that each player completed their move logic before the controller declared victory. Complex **guards** and **timing constraints** prevented overlap and deadlock.

Week 4: Finalizing Controller and Running Full Simulations

A dedicated **GameController template** was added to manage synchronization and flow control. It monitored the game status using `turn` and `win` signals, and reset game variables when needed.

The `gameOver` flag prevented further moves after a win condition was met.

Finally, the model was thoroughly tested using queries like:

- `A[] not deadlock` (the system is always deadlock-free)
- `E<> Player1.Win` and `E<> Player2.Win` (each player can win under some scenario)