

Tactical Chaos

Our project for this year will be a strategic board game. We will call it Tactical Chaos. It is a game where the player tries to eliminate its opponents champions in turn based gameplay.

Like Monopoly, Risk, Civilization or any turn based strategy board game, Tactical Chaos goal is defeat all other players by developing a strategy and implementing it in small steps by each turn. Turn means there are set of actions will be repeated. In Monopoly, the turn is rolling the dice, then moving the avatar according to the dice, then buying property, building house or hotel, or any other thing based on what the game rules are.

In our game, each turn consists of two steps **planning** step where the players buy champions and give them orders. And the second step is the **execution** of the players' plans.

Each player will build a team by buying champions from the store. We will divide the game into two phases. The first nine rounds is phase one. Where the players place their champions on the map. The second phase will be run automatically by executing the player's plans.

The game will end after N round, or when only one player's champions remain in the arena.

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Game environment

- Board game (100X100) squares;
- Up to 8 players;
- Each player will have up to 9 champions in the arena;
- In each round, the player can buy champions from a limited temporal store (5 random champions from the complete champions list, will be updated each round);
- Buying the same champion 3 times will promote him/her into level 2;
- Having 3 copies of level 2 champion will promote him/her into level 3 (max level);
- Each champion belongs into 2/3 classes;
- Assembling champions that belong to the same class will grant the team (player's champions) additional abilities (see appendix 2);
- Each player has a bench that can keep up to 8 champions;
- Planning phase has limited time; players must decide their actions within that time.
- At the beginning of each round, all players will receive 2 golden coins;

First nine rounds

- In the first 9 rounds, players will buy and put champions in any square in the map;
- Other players champions will be hidden;

After the ninth round

- Each player can buy and sell champions (biased on their price – look to appendix 1);
- Each player can select any number of his champions in the battlefield and give him/her an order:
 - Move in a specific direction;
 - Attack a specific enemy (if the enemy in the champion range);
 - Use the ability (if it's available);
- Each round will have new order for the players to make their action;
- In planning phase, the player can swap between champions on the bench and the arena; player can swap up to two champions;
- In the end of the planning phase, the game will calculate the players' classes and buff their teams with the appropriate classes buffs;
- When a champion dies, he/she will be excluded from the game and the player will lose its buff (from the classes);
- When a champion dies, his/her owner team size will be decreased by one.

Example

1. Player1 plan:
 - 1) Move Fiora to the left;
 - 2) Use the ability of Shen;
 - 3) Aatrox will attack Darius (Player2 champion).
2. Player2 plan:
 - 1) Darius will use his ability;
 - 2) Garen will attack Shen;
 - 3) Poppy will attack Shen.

The execution will be:

1. In this turn, the game decided to execute Player1's plan first. So Fiora will move to the left by N square depending on her movement speed. Shen will activate his ability to make himself and all allies in N radius dodge from basic attack. In addition, Aatrox will attack Darius by basic attack. All of these actions will be executed by the same order of the player's plan. Since Fiora, Shen and Aatrox are blade masters; Aatrox has a chance to attack Darius twice according to blade masters class buff.
2. After the execution of the Player1 plan, the game will execute Player2s. Darius will use his ability, but maybe Darius will be dead before that if Aatrox attack killed him. Garen and Poppy will try to attack Shen. Nevertheless, he already activated his ability and will dodge their attacks.

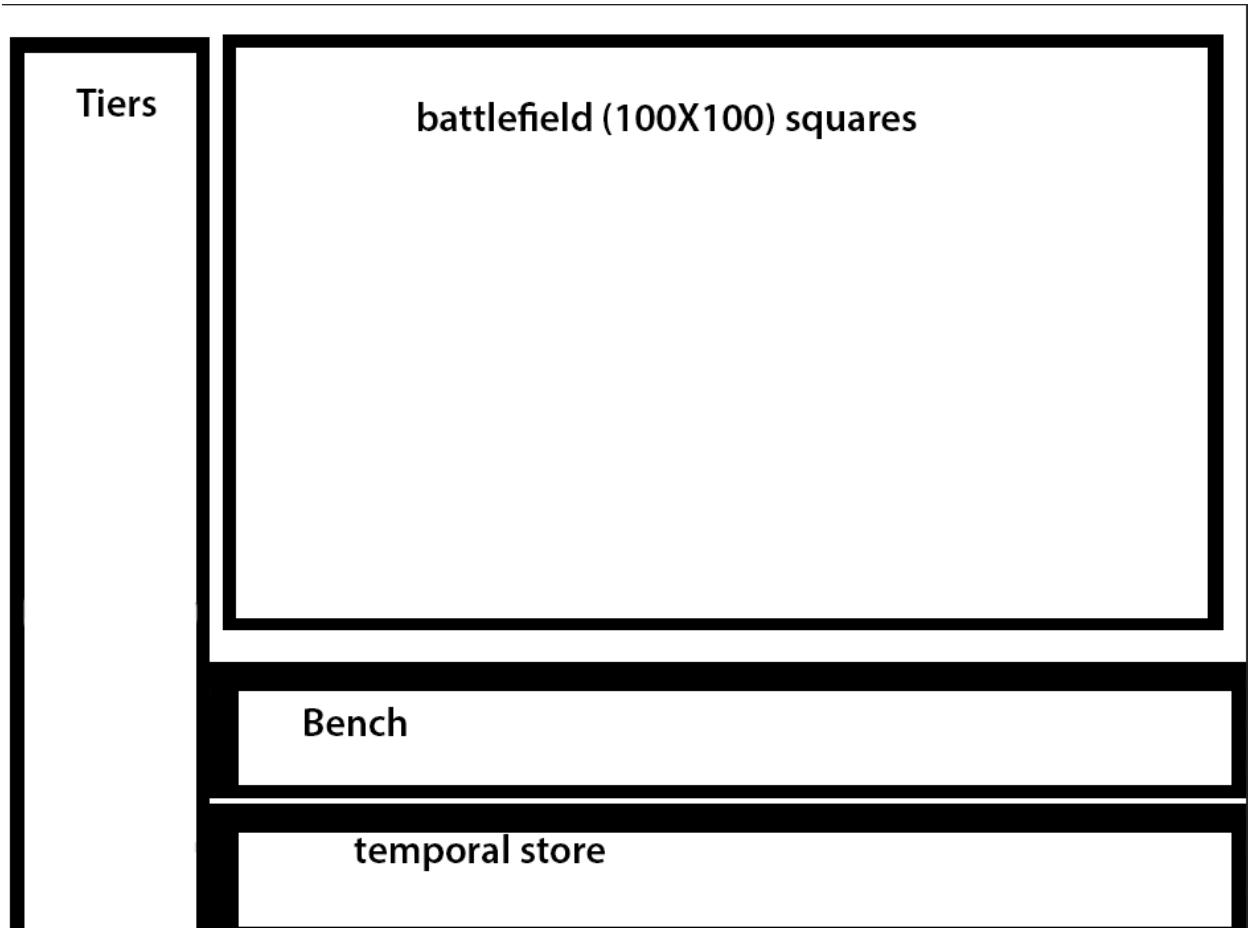
Notice that the plan of attacking Aatrox to Darius should be available and validated in the planning phase. Where Darius is in Aatrox attack range and Aatrox is not stunned. Also none of the players know which one plan will be executed first.

Champion

Each champion has the below attributes:

- **Health:** champion dies when his/her health reaches 0;
- **Armor:** negates enemies' attacks (discounted factor of attacker's attack damage);
- **Magic resist:** negates enemies' abilities (discounted factor of the attacker's ability damage);
- **Vision range:** radius of an area that the champion has vision on it (knows its type and the champions that seize it except for grass square type);
- **Attack range:** for basic attack;
- **Movement speed:** number of squares the player can move on one move command;
- **Critical strike chance:** a probability for the current basic attack to deal extra damage;
- **Critical strike damage:** an amplification factor of the basic attack used when the game decides the current basic attack is critical;
- **Ability charge (mana):** starts zero and increase when champion gets or deals damage. (Some champions do not have ability charge).
- Champions abilities are something like
 - AOE (Area Of Effect) like damaging champions inside a radius;
 - Healing: restore health;
 - Shielding: absorbing some damage for few rounds;
 - Stun: make the enemy champion unable to take command;
 - Silence: make the enemy champion unable to gain mana;
 - Dash jumping throw the map;
 - Amplifying champion attributes;
 - All abilities can be cast on single champion or as AOE.

A proposal of the game interface



Game Implementation

In this milestone, we will focus on implementing the core functionality of the game. Please notice that after delivering this milestone, we will ask you to implement some changes and upgrades. These changes will might look like break changes if your design is not well structured and abstract.

Functionality 1 (3 marks)

You should build the core of the game, which is the game environment. This functionality require console interaction only (no GUI) See appendix A.

- The battle arena;
- Picking champions from list without cost in the planning (max 3 champions in each round);
- Champions with basic attack and move only;
- Planning phase;
- Execution phase;
- You should provide a valid case of using inner classes and exceptions handling.

Functionality 2 (3 marks)

- Champion ability including AOE as described in appendix 2;

Functionality 3 (2 marks)

- Developing the temporal store where the player must pay to own a champion;
- Temporal store will refresh its champion each turn;
- Each player in the same turn will have different champions in this temporal store;
- Each champion have limited copies in the main store. Ex: there is only 10 copies of Darius in the main store.

Functionality 4 (3 marks)

Develop an interface to read the arena size and other parameters like maximum team size, maximum number of rounds, maximum allowed swaps in planning phase, and accepted classes in this game... etc. All variables should be configurable outside the code.

Accepted classes will filter the champions list to these accepted classes only.

Functionality 5 (3 marks)

Develop a GUI for the game

Functionality 6 (3 marks)

Develop a bot that play random actions. We can play with 7 bots and 1 player, and we can play with 8 bots (we just watch the game).

Additional functionalities

- Hints on the store like when there is a champion will grant new class or upgrade the player champion from Level 1 to 2; two marks
- Implementing some champions (see appendix 1). These champions' abilities have different concept than the standard like Azir who creates two soldiers to fight with him; two marks
- Develop better bot that the random actions. one marks

Project organization

- Each three students from the same class will work together;
- Students from different classes is forbidden;
- Groups from four students is ok but the additional functionalities will be mandatory;
- Additional functionalities have 0 marks if one of the main functionalities are not implemented;
- Functionalities evaluation has four levels:
 1. The functionality is working and the application works: full marks if the evaluator does not have any concerns or questions.
 2. The functionality is not completely finished but the application works: if there is a serious try then the team will take the half.
 3. Both the functionality and the applications are not working: if the team has deep understanding of how it should be developed then the team will take few marks.
 4. There is no serious try to implement and the team does not understand how to do it then they will take zero.
- Delivery report must show the tasks and efforts of all students;
- Delivery report **MUST** be two pages only and contains the data structure and the algorithms;
- On the evaluation session, the group should provide the evaluation form (see appendix B);
- Project delivery will be by running the application, and then the evaluator has the right to ask any question about the project and the implementation.

Delivery dates

This project should be delivered on December 5th and 8th. Groups can postpone the evaluation session one week but the evaluation will be for 50% of the marks.

Appendix A

Console interaction

We can implement the whole game on console by the repeated drawing of the battle arena. We can use each character of the ASCII to refer to a specific meaning. For example:

- ###: means this square is empty;
- AT12: Player 1 has Aatrox level 2 in this square;

Below each draw we can provide the detailed state of the game. For example:

- Player 1 team:
 - Yasuo: position: 45,23. health: 200/300, Mana: 80/100;
 - Ashe: position:10,90. health: 2/250, Mana:99/100, STUNNED for the next 2 rounds.
 - Ties:
 - Yasuo, Fiora, Shen are blade masters;
 - Ashe and Vayne are Rangers.

Planning phase will not have limited time. Instead, we will read the plan of each player sequentially. For example:

- Player 1: champion: Warwick:
 1. Move to left
 2. Move to right
 3. Move up
 4. Move down
 5. Attack: Lucian
 6. Attack: Akali
 7. None

Appendix B
Delivery Form

First Milestone

Class number

Delivery date

Number of students

Student's names

Functionalities	Evaluation	Marks
Functionality 1		
Functionality 2		
Functionality 3		
Functionality 4		
Functionality 5		
Functionality 6		
Additional functionality		
Final Marks		

Appendix 2

Champion classes

Each champion belongs into two or three classes. Assembling champions from the same class will empower the team with new abilities.

- **Demon:** Deploying multiple Demons grants them a chance to burn away their target's mana, dealing damage based on the amount of mana burned. This chance increases with more Demons.
 - 2: burns 20 mana;
 - 4: burns 40 mana;
- **Dragons:** Deploying two or more Dragons make them immune to ability damage.
- **Glacial:** Deploying multiple Glacial grants their attacks a chance to stun their target, increasing with more Glacial.
- **Imperial:** grants all imperials double damage.
- **Noble:**
 - Deploying three noble will grant one champion (not mandatory to be noble) 20 extra armor and 40 heal on hit;
 - Deploying six noble will grant all the team.
- **Ninja**
 - Deploying exactly one Ninja grants it 50% critical strike chance and 200% critical strike damage;
 - Deploying every Ninja grants all of them 75% critical strike chance and 300% critical strike damage;
- **Pirate:** Deploying 3 pirates will grant 2 additional gold in the end of each round.
- **Wild:**
 - Having 2 wilds will grant them 10% incremental attack speed on hit up to 80%;
 - Having 4 wilds will grant the team this buff.
- **Void:**
 - Having 2 void will grant one of them true damage;
 - Having 4 void will grant all of them true damage;
 - True damage: ignore the armor and the magic resist.
- **Yordle:**
 - 2: 15% chance to miss the attack;
 - 4: 30% chance to miss the attack;
 - 6: 50% chance to miss the attack;
 - Miss the attack: enemies attack damage might deal 0 damage but will grant them mana.
- **Assassin:** sneak across the battlefield at the start of combat, placing themselves opposite from where they started.
 - 2 assassin: +30 damage and 10% spell damage;
 - 4 assassin: +60 damage and 20% spell damage.
- **Blade-master** Deploying multiple Blademasters grants their attacks 40% chance to hit extra times.
 - 3: 1 extra attack;
 - 6: 2 extra attacks;

- 9: 4 extra attacks;
- **Brawler** Deploying multiple Brawlers grants them extra health, increasing with more Brawlers.
 - 2: 250 extra health;
 - 4: 500;
 - 6: 1000;
- **Elementalist:** gain more mana than usual from attacking.
 - 2: double mana;
 - 4: double mana and grant the team an extra place for 10th champion;
- **Gunslinger** Deploying multiple Gunslingers grants their attacks 40% chance to hit additional targets.
 - 2: 1 extra enemy;
 - 4: 2 extra enemies;
 - 6: 4 extra enemies.
- **Knight** Deploying multiple Knights lets the team block damage from incoming attacks.
 - 2: 5% less damage;
 - 4: 8% less damage;
 - 6: 12% less damage;
- **Ranger** Deploying 3 or more Rangers grants them a double range.
- **Shapeshifter** Deploying enough Shapeshifters grants them health on transformation.
 - 3: 40% extra health;
 - 6: 100% extra health;
- **Sorcerer** Deploying multiple Sorcerers grants your team ability power.
 - 3: 40% additional ability power;
 - 3: 10% additional ability power;
 - 9: 170% additional ability power;