



MicroRTS

Checkpoint 3



Toolchain

Source code management tool - Github

Build systems - Apache Netbeans

Documentation tool - Doxygen will be used

IDEs - Apache Netbeans

Static analysis tools - Apache Netbeans has a built-in feature for static analysis for Java

Testing tools - Apache Netbeans

Any other tools/libraries/SDKs/framework instrumental in your project - VS Code for editing code, MICRORTS library by Farama Foundation

Toolchain - Netbeans and Visualization

To test a bot, MicroRTS has a file `GameVisualSimulationTest.java`. This class allows to play any bot against each other on a given map. We use Netbeans, the Java IDE to test our bots since the tutorial for setup for MicroRTS was done on Netbeans and the setup is relatively complex. Netbeans also offers static analysis built into the IDE.

```
public class GameVisualSimulationTest {  
    public static void main(String[] args) throws Exception {  
        UnitTypeTable utt = new UnitTypeTable();  
        PhysicalGameState pgs = PhysicalGameState.load(fileName: "maps/16x16/basesWorkers16x16.xml", utt);  
        // PhysicalGameState pgs = MapGenerator.basesWorkers8x8Obstacle();  
  
        GameState gs = new GameState(a_pgs: pgs, a_utt: utt);  
        int MAXCYCLES = 5000;  
        int PERIOD = 20;  
        boolean gameover = false;  
  
        AI ai1 = new WorkerRush(a_utt: utt, new BFSPathFinding());  
        AI ai2 = new RandomBiasedAI();  
    }  
}
```

Map

Bots to play

Progress



We each implemented our own bot based on the prototyping, we did on the original MINS bot. We created separate branches and began development on our own bots and have begun to test them against each other and the default bots available (ie. Worker Rush).

Miguel: I implemented a bot that attempts to combine the ideas of proxy rush and light rush. The idea behind my strategy is to quickly establish a barracks unit close to enemy structures and try to quickly mobilize a large number of light units to overwhelm the opposition before they can establish a baseline for resources and others. The intent is to quickly outleverage the opponent. However, the strategy mainly hinges upon successful establishment of the initial barracks and a strong and effective initial attack with the light units. Should that fail, my bot would be likely to lose. Different test scenarios will be noted as they are conducted.

Progress



Matthew: I further developed the AI and experimented with several methods for improvement. The primary addition I made was creating a method for basing some decisions on simulations of potential future games while others remain hard coded. This allows units to perform actions based fully on simulated games, perform fully hardcoded actions, and perform action simulated to be the best from a limited set of actions expected to be beneficial. I also attempted several methods to increase performance including more efficient tracking of changes to the game state during a turn.

Akshay: I developed a bot in a separate branch which is based on our initial code of MIPS bot and mayari bot, this bot will be a defensive/ resource gathering bot to begin the match and will primarily use light and heavy units to attack enemy barracks and flank to enemy base. I will be basing the pathing of the Units from the mayari bot code to make them work in as many maps as I can without the units bugging out and running into terrain and doing nothing.

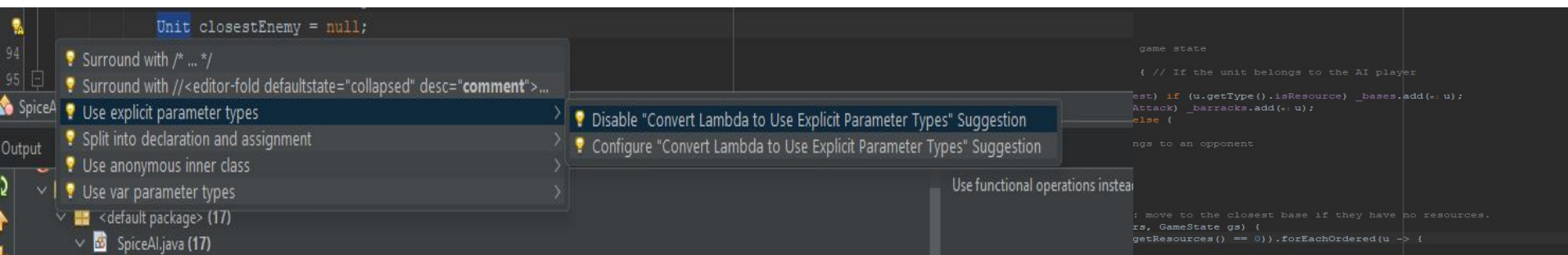
Static Analysis

Miguel: I used Netbeans for my static analysis. Almost all issues are suggestions on how to improve the code, such as changing explicit types to just 'var'. There was one problem where I was missing a type for a variable, but other than that, there is nothing that would critically affect the security or performance of the project. I fixed the missing variable type issue. There are also a number of “never used” or “not read” issues that stem from me not yet having used or planning to use these methods. The methods I don't plan on using I will delete to clean up the code.

```
1 package miguel_mine_bot;
2
3 import ai.core.AI;
4 import ai.core.AIWithComputationBudget;
5 import ai.core.ParameterSpecification;
6 import java.util.ArrayList;
7 import java.util.List;
8 import java.util.LinkedList;
9 import rts.GameState;
10 import rts.PlayerAction;
11 import rts.UnitAction;
12 import rts.units.Unit;
13 import rts.units.UnitType;
14 import rts.units.UnitTypeTable;
15 import java.lang.Math;
16 import ai.abstraction.pathfinding.AStarPathFinding;
17
```

Output - microBTS (run) Inspector x
Miguel_MINE_Bot.java (40)
Miguel_MINE_Bot.java (40)
8 Unused imports
15 Import from java.lang Package
21 Missing javadoc.
24 Variable startTime is never read
25 Field maxTime can be final
25 Variable maxTime is never read
34 Missing javadoc.
43 Missing javadoc.
48 Missing javadoc.
48 clone() does not call super.clone()
54 Missing javadoc.
60 Missing javadoc.
66 Explicit type can be replaced with 'var'
67 Explicit type can be replaced with 'var'
67 Can use functional operations
99 Missing javadoc.
100 Explicit type can be replaced with 'var'
101 Explicit type can be replaced with 'var'
102 Explicit type can be replaced with 'var'
102 Can use functional operations
108 Explicit type can be replaced with 'var'
108 Variable budget is never read
112 Explicit type can be replaced with 'var'
119 Missing javadoc.
120 Explicit type can be replaced with 'var'
126 Missing javadoc.
178 Explicit type can be replaced with 'var'
128 Explicit type can be replaced with 'var'
129 Explicit type can be replaced with 'var'
129 Variable closestDistance is never read
133 Explicit type can be replaced with 'var'
144 Explicit type can be replaced with 'var'
152 Missing javadoc.
154 Explicit type can be replaced with 'var'
155 Explicit type can be replaced with 'var'
159 Explicit type can be replaced with 'var'
160 Explicit type can be replaced with 'var'
160 Variable currentUnit is never read
160 Can use functional operations
166 Explicit type can be replaced with 'var'
166 Variable produceWorker is never read
177 Explicit type can be replaced with 'var'
178 Explicit type can be replaced with 'var'
182 Explicit type can be replaced with 'var'
201 Explicit type can be replaced with 'var'
206 moveTowardsUnit is never used
207 Explicit type can be replaced with 'var'
212 moveTowardsPosition is never used
213 Explicit type can be replaced with 'var'

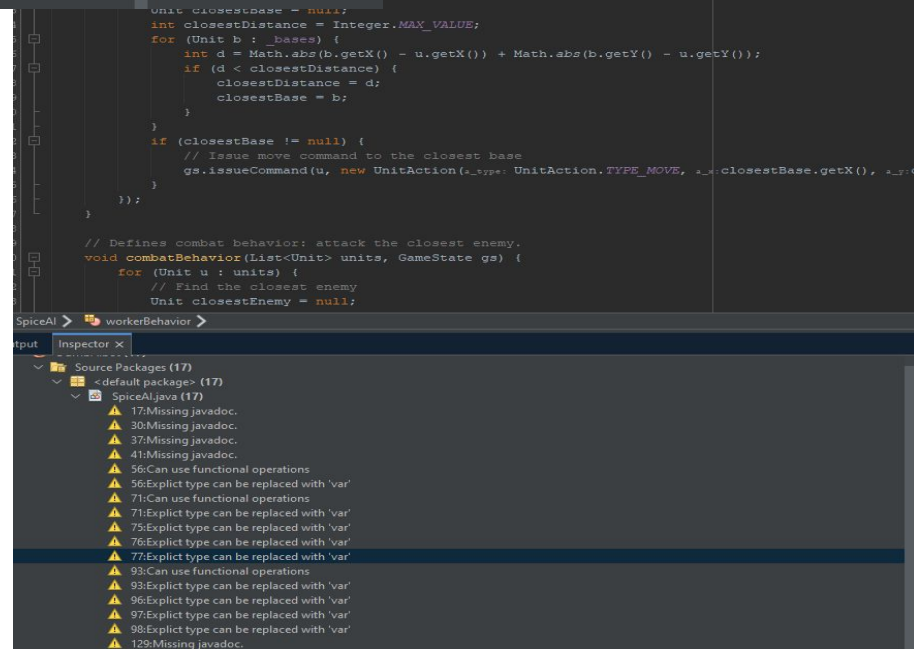
Static Analysis



Akshay: Used Netbeans built in Static Analysis tool.

On my bot the issues that pop up after running the Analysis tool on my file are mostly Syntax suggestions and missing documentations on function.

The Static Analysis tool points out the syntax suggestions and upon clicking on the line number it will give several option in a dropdown menu on what I can change to make the code more precise.

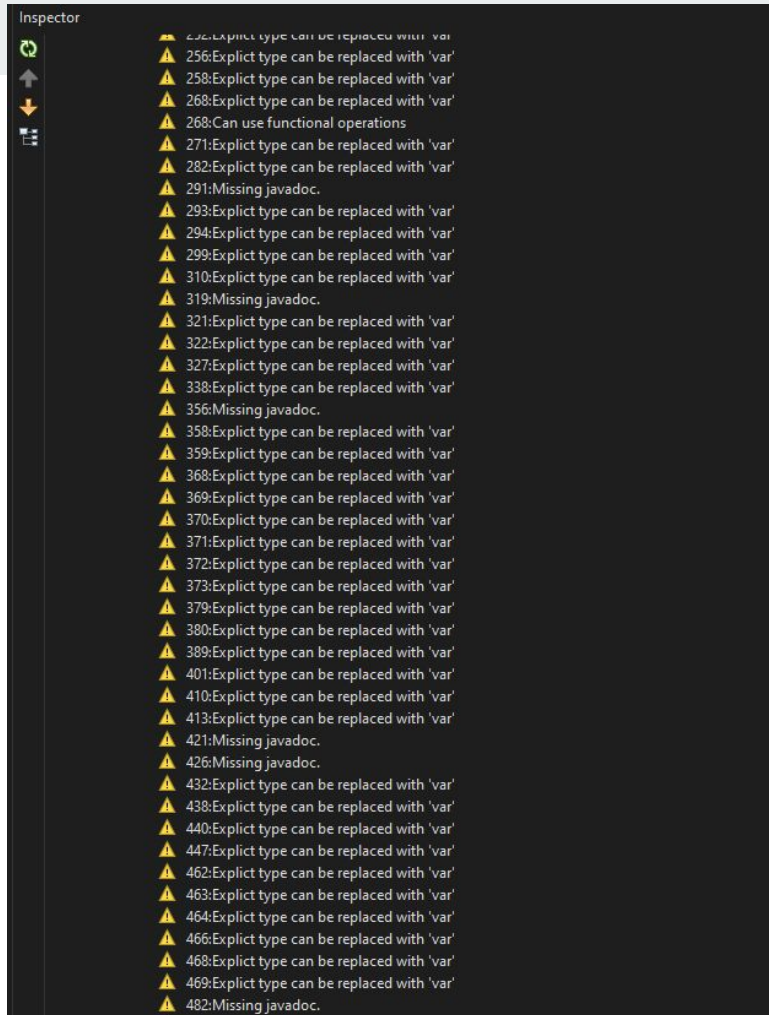


Static Analysis



Matthew: Used Netbeans built in Static Analysis tool.

During development the built in static analysis frequently suggests various other ways of writing a line of code including warnings if something is not ideal. Due to this allowing me to resolve issues as they arise when running the static analysis tool separately it almost entirely finds small notes like changing explicit variable types to var or adding javadocs.





Plans Going Forward

Our plan is to further develop our bots to become more robust and optimized. As of now, our bots are only fairly effective maybe against particular bots or on specific maps. Our hope is to broaden the range of effectiveness of our bots. We also plan to play our bots against each other to continually develop and improve them.



Additional Items for Grading



Meeting Attendance Sheet

10/19/23 - All members attended

10/24/23 - All members attended except Ilias



Matthew Berry

Ohio ID, Github Username: mb135821, MatthewBerry135821

Contributions: Further individually implemented MINS_Bot including changes such as simulated decisions and performance improvements

<https://github.com/OU-CS3560/microrts-f23/commit/252bc35ade311e829479dd20ec152974f7ef7aac>



Akshay Patel

Ohio ID, Github Username: sp550519, Shayz614

Contributions: Created a new AI bot based on Our Initial MINS bot and mayari bot and did some bug fixing and refactoring, We are keeping our Ai's in different branches until we decide to move one that has most promise to the main branch.

<https://github.com/OU-CS3560/microrts-f23/commit/c7f1249445c60243ef3797141a01328573ccf439>

<https://github.com/OU-CS3560/microrts-f23/commit/cbca101afb1f99bcd36508dd435e2de7514c03b9>



Ilias Baktybek

Ohio ID: ib873519, Github Username: iliasbaktybek

Contributions:



Miguel Quemado

Ohio ID: mq003322, Github Username: MQUEMADO16

Contributions:

Created new bot based on main and utilizing methods for pathfinding found there. Implemented an attempt at a proxy light unit rush.

Commits:

<https://github.com/OU-CS3560/microrts-f23/commits/miguel-branch>