Team Members and Advisor:

Our team consists of Tyler Gutowski (tgutowski2020@my.fit.edu), and Trevor Schiff (tschiff2020@my.fit.edu). Our advisor and our client is Dr. Ryan Stansifer (ryan@fit.edu), a compiler researcher who has a deep understanding of the Java compiler.

We met with Dr. Stansifer on 8/30/23 at 5 PM to foster a deeper understanding of the project.

To successfully navigate through this project, we are implementing a garbage collector into the MiniJava compiler. This project will require us to deep-dive into garbage collector implementations, understanding and learning from them to write one that caters to the project's goals.

Key Features and Challenges:

Our primary goal will be to develop a custom garbage collector for the MiniJava compiler. We will also conduct extensive tests to decipher the best-suited implementations for specific algorithms.

A few challenges that we will face during our work will be choosing a base from various open-source JDK builds originating from OpenJDK for implementation or tuning. Transitioning from understanding memory management at a user level to mastering it at the JVM level will also be a difficult task, because it will require us to develop upon skill sets that we are currently lacking in. Finally, we must establish appropriate datasets and algorithms for testing various GC implementations.

Milestones:

A pathway comprising of three significant milestones has been devised. Each milestone contains tasks aimed at gradually building up the project up to a fully functional system.

Milestone 1 (Oct 4):

1. Literature Review:
   - Comprehensive analysis of the Garbage Collector Handbook to grasp terminology, techniques, and algorithms.
   - Evaluation of the pros and cons of various garbage-collection strategies.
   - Examination of open-source garbage-collection projects for enhanced understanding.
2. Requirements Gathering:
   - Defining the objectives and scope of the project.

- ○ Determining the vital metrics to be measured.
3. Feasibility:
    - ○ Assessment of the project's feasibility considering the current skill sets.
    - ○ Identification of prospective challenges and mitigation strategies.
4. Design:
    - ○ Selection of the suitable garbage collection algorithm.
    - ○ Development of high-level design outlining the main components of the garbage collector.
    - ○ Crafting detailed design documents elucidating the data structures and algorithms to be employed.

Milestone 2 (Oct 30):

1. Architecture:
    - ○ Finalization of the garbage collector's architecture.
    - ○ Establishment of integration points with the compiler.
    - ○ Development of a prototype to validate the architecture.
2. Tools and Setup:
    - ○ Selection and setup of development tools and environment.
    - ○ Configuration of version control and project management tools.
    - ○ Establishment of a testing framework and continuous integration pipeline.
3. Coding Phase:
    - ○ Commencement of the implementation of the garbage collector's core components.
    - ○ Implementation of logging and debugging tools.
    - ○ Testing and demo of the core components.

Milestone 3 (Nov 27):

1. Continuation of Coding Phase:
    - ○ Implementation of identification and marking functionality.
    - ○ Integration with the compiler and memory pool management.
    - ○ Addressing memory leaks and demoing the added functionalities
2. Testing and Demoing to the customer

Task Distribution Matrix:

The task matrix delineates the division of responsibilities between the team members, ensuring a balanced workload and efficient progress.

Task	Trevor	Tyler
Analyze different gc strategies	write 25%	write 75%
Debugging tools	write 25%	write 75%
Integration with compiler	write 75%	write 25%
Memory pool management	write 50%	write 50%
Memory Leaks	write 50%	write 50%
Implement identification and marking functionality	write 75%	write 25%
Design test documents	write 50%	write 50%
Requirements gathering	write 50%	write 50%

Approval from Faculty Advisor:

"I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones." Signature: _____ Date: _____