Magi Compiler Features

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1 Object Oriented Programming

1.1 Where are the Java Codes

/src/Compiler/FrontEnd/ConcreteSyntaxTree/Listener/*
/src/Compiler/FrontEnd/AbstractSyntaxTree/Type/ClassType/*
/src/Compiler/Environment/ClassTable.java

1.2 An Example

```
class Animal {
    public string name;

    public Animal() {
        name = "animal";
    }

    public void print() {
        println("I'm a " + name);
    }
}

class Dog extends Animal {
    public Dog() {
        name = "dog";
    }
}

class Cat extends Animal {
    public Cat() {
        name = "cat";
    }
}

class Person extends Animal {
    public Person() {
        name = "person";
    }
}

int main() {
    new Animal().print();
    new Dog().print();
    new Cat().print();
    new Person().print();
}
```

1.3 Advisory Test Case

```
/report/bonus/data/object-oriented-programming/*
```

2 Single Static Assignment

2.1 Where are the Java Codes

```
/src/Compiler/BackEnd/ControlFlowGraph/Instruction/PhiFunctionInstruction.java
/src/Compiler/BackEnd/ControlFlowGraph/SingleStaticAssignment/*
```

2.2 How to Print the SSA Form

- `make all && cd bin/`

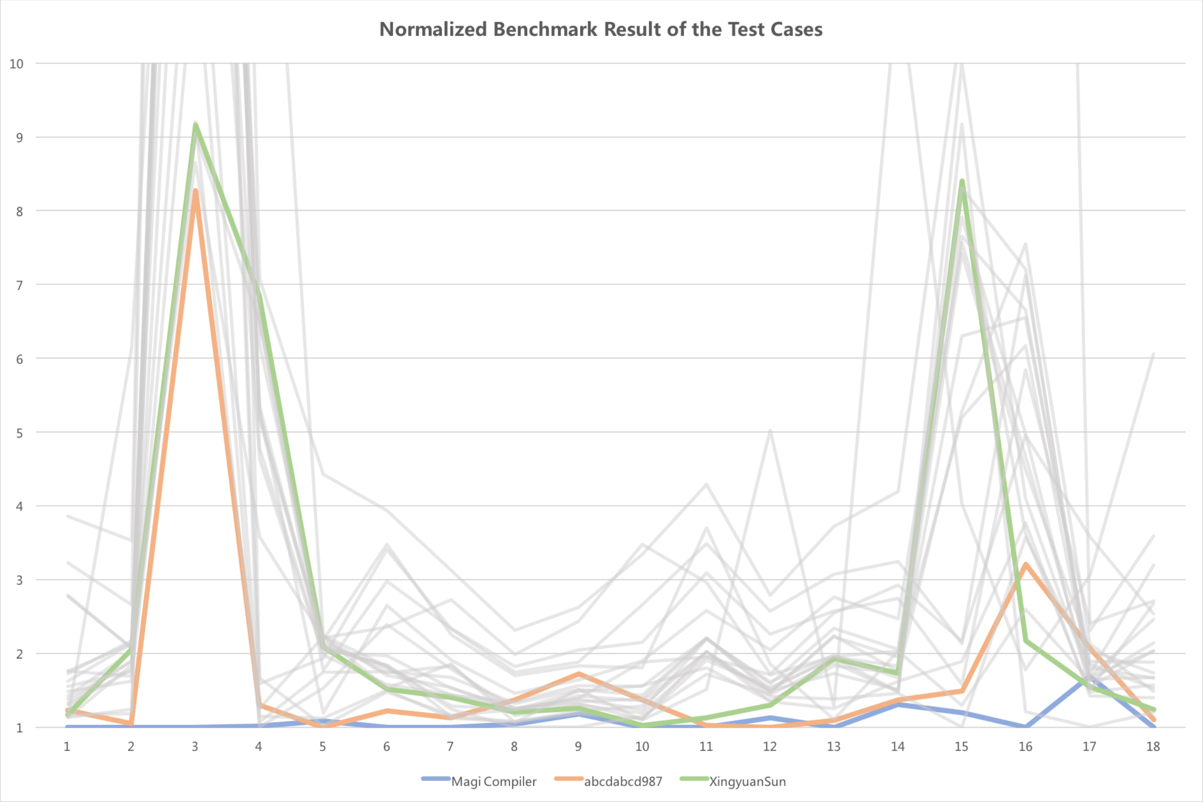
-
  ```
  vim data.mx
  # input a Magi language code
  ```

-
  ```
  java -jar Compiler.jar -ssa < data.mx > assem.s
  # `-ast` to print the AST, `-ir` to print the IR after optimized
  ```
- `spim -file assem.s`

2.3 Advisory Test Case

```
/report/bonus/data/single-static-assignment/*
```

2.4 Normalized Benchmark Result (compared with other students implemented SSA)



3 Optimizations

3.1 Leaf Function Optimization

3.1.1 Where are the Java Codes

/src/Compiler/BackEnd/Optimizer/LeafFunctionOptimizer.java

3.2 Control Flow Optimization

3.2.1 Where are the Java Codes

/src/Compiler/BackEnd/Optimizer/ControlFlowOptimizer.java

3.3 Useless Code Elimination

3.3.1 Where are the Java Codes

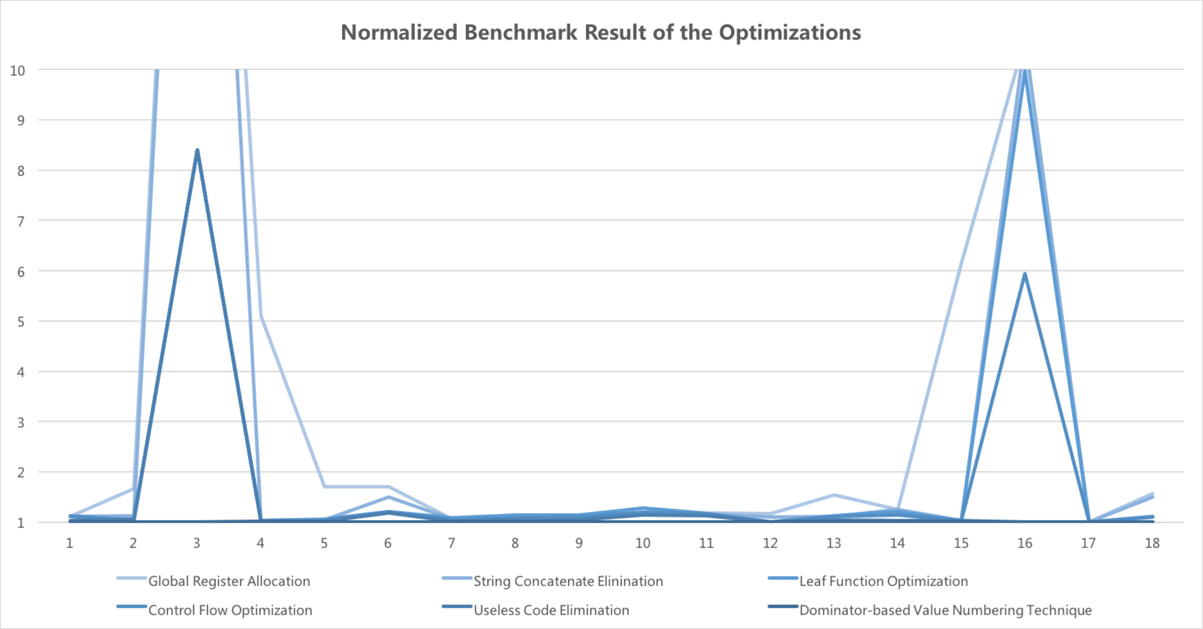
/src/Compiler/BackEnd/Optimizer/UselessCodeEliminator.java

3.4 Dominator-based Value Numbering Technique

3.4.1 Where are the Java Codes

/src/Compiler/BackEnd/Optimizer/DbVNTOptimizer.java

3.5 Normalized Benchmark Result of the Optimizations

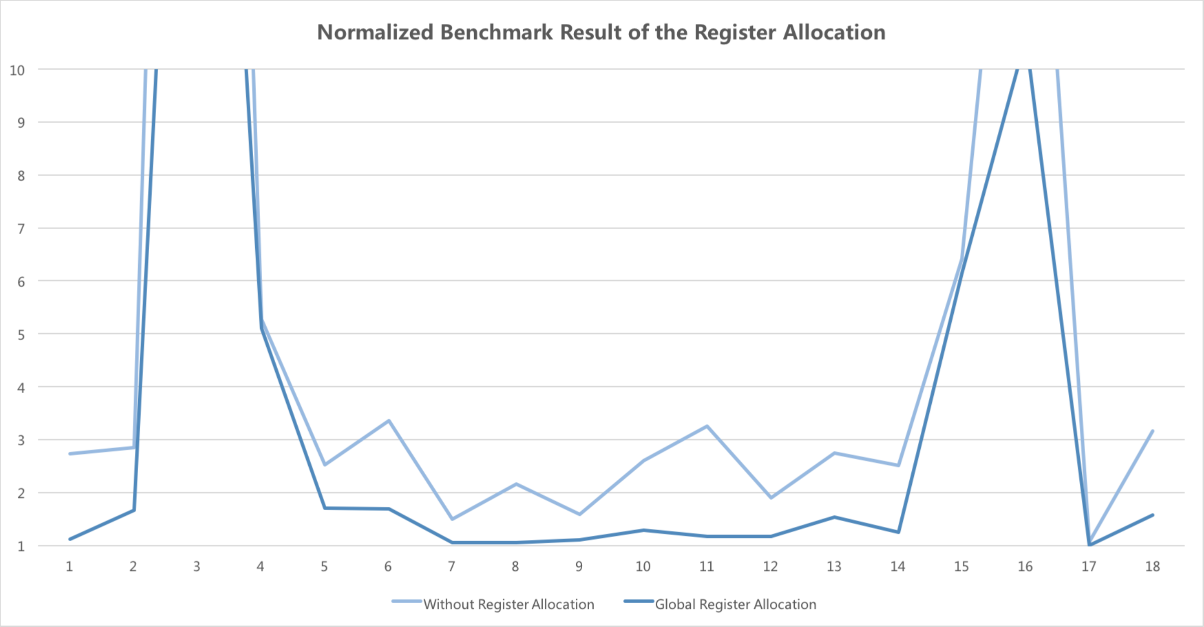


4 Global Register Allocation

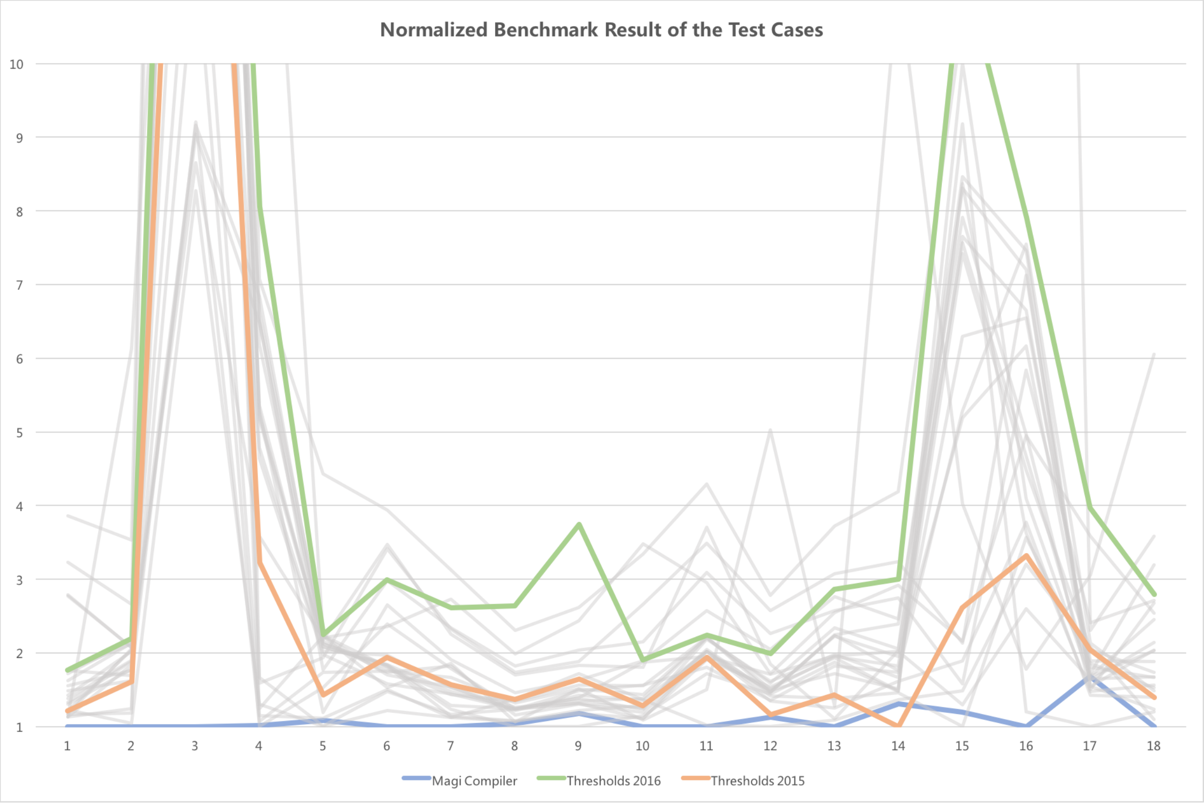
4.1 Where are the Code

/src/Compiler/BackEnd/Allocator/*

4.2 Normalized Benchmark Result of the Register Allocation



5 Normalized Benchmark Result of the Test Case


Normalized Benchmark Result of the Test Cases
Magi Compiler
Thresholds 2016
Thresholds 2015