



## Array Bounds Check Elimination For C1X

Master thesis project for: ...

Student ID: ...

E-mail: ...

C1X is a Java port of the HotSpot™ Client compiler. It is part of the Maxine virtual machine. The goal of this project is to implement a fast array bounds check elimination algorithm for this compiler. There is a description for array bounds check elimination for the original client compiler that can be used as a basis (see reference to paper below).

The implementation should be tested and evaluated on Java benchmarks such as the SciMark and the DaCapo benchmark suite.

### Usage of Array Bounds Check Elimination

Consider the following common Java code sequence:

```
for (int i=0; i<a.length; i++) {  
    a[i] = 0;  
}
```

The Java virtual machine has to make sure that an array is never accessed out of bounds. Therefore it modifies the semantics of the code such that it is equivalent to the following:

```
for (int i=0; i<a.length; i++) {  
    if (i >= a.length) {  
        throw new IndexOutOfBoundsException();  
    } else {  
        a[i] = 0;  
    }  
}
```

The additional check before the array access results in a significant slow down at runtime, while the checks never fail in a normal Java program. Array bounds check elimination tries to prove at compile time that a check can never fail and therefore can be removed.

### Referenced Paper

Thomas Würthinger, Christian Wimmer, Hanspeter Mössenböck:

[\*Array Bounds Check Elimination in the Context of Deoptimization\*](#)

Special Issue on Principles and Practices of Programming in Java (PPPJ 2007), February 2009

Contact: Dipl.-Ing. Thomas Wuerthinger (wuerthinger@ssw.jku.at)