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MatriCs

the ultimate matrix manipulation language

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What if you had the power to create matrices of any dimension?

Time to go beyond dimensions...

MatriCs

the ultimate matrix manipulation language

MatriCs is a specialized language for matrix manipulation.

- *Strongly typed language*
- *C - like syntax*
- *Special operators for vectors and matrices*
- *Compiles into LLVM*

Welcome to the world of MatriCs

Let's learn some MatriCs

MatriCs - the basics

- ★ Primitives: Integer, Boolean, Float, String, Void
- ★ Special Data Type: n dimensional Vectors
- ★ Comments:
  - // - for single line comments
  - /* */ - for block comments
- ★ Arithmetic Operators: +,-,*,/,++,--,%
- ★ Control Flow: if, else if, else, while, for, return
- ★ Conditionals: ==, !=, <, <=, >, >=
- ★ Logical Operators: !, &&, ||
- ★ Standard Library: Matrix Addition, Matrix Subtraction, Print Matrices, Transpose, Identity

MatriCs Properties

```
int main() {
        // This is a comment
        /* This is *
         * another *
         * comment */
        return 0;
}
```

Comments

Declaration of a 4 Dimensional matrix!!!!

```
int main() {
        int[2,2,2,2] a;
        int i;
        int j;
        int k;
        int l;

        a = [[[[1,2], [3,3]],
                [[7,2], [9,1]]],
                [[[1,2], [3,3]],
                [[7,2], [9,1]]]];

        for (i = 0; i < 2; i = i+1) {
                for (j = 0; j < 2; j = j+1) {
                        for (k = 0; k < 2; k = k+1) {
                                for (l = 0; l < 2; l = l+1) {
                                        print_int(a[i,j,k,l]);
                                }
                        }
                }
        }
        return 0;
}
```

MatriCs Properties Continued

```
int main() {
        int[4] b;
        b = [1, 2, 3, 4];

        if (b[1] == 3) {
                printb(true);
        }
        else {
                printb(false);
        }
}
```

if/else

```
int main() {
        int i;
        i = 1;
        while (i < 5) {
                print_int(i);
                i = i + 1;
        }
        return 0;
}
```

while

```
int main() {
        int[2,2,2,2] a;
        int i;
        int j;
        int k;
        int l;

        a = [[[[1,2], [3,3]],
                [[7,2], [9,1]]]
                [[[1,2], [3,3]],
                [[7,2], [9,1]]]];

        for (i = 0; i < 2; i = i+1) {
                for (j = 0; j < 2; j = j+1) {
                        for (k = 0; k < 2; k = k+1) {
                                for (l = 0; l < 2; l = l+1) {
                                        print_int(a[i,j,k,l]);
                                }
                        }
                }
        }
        return 0;
}
```

for

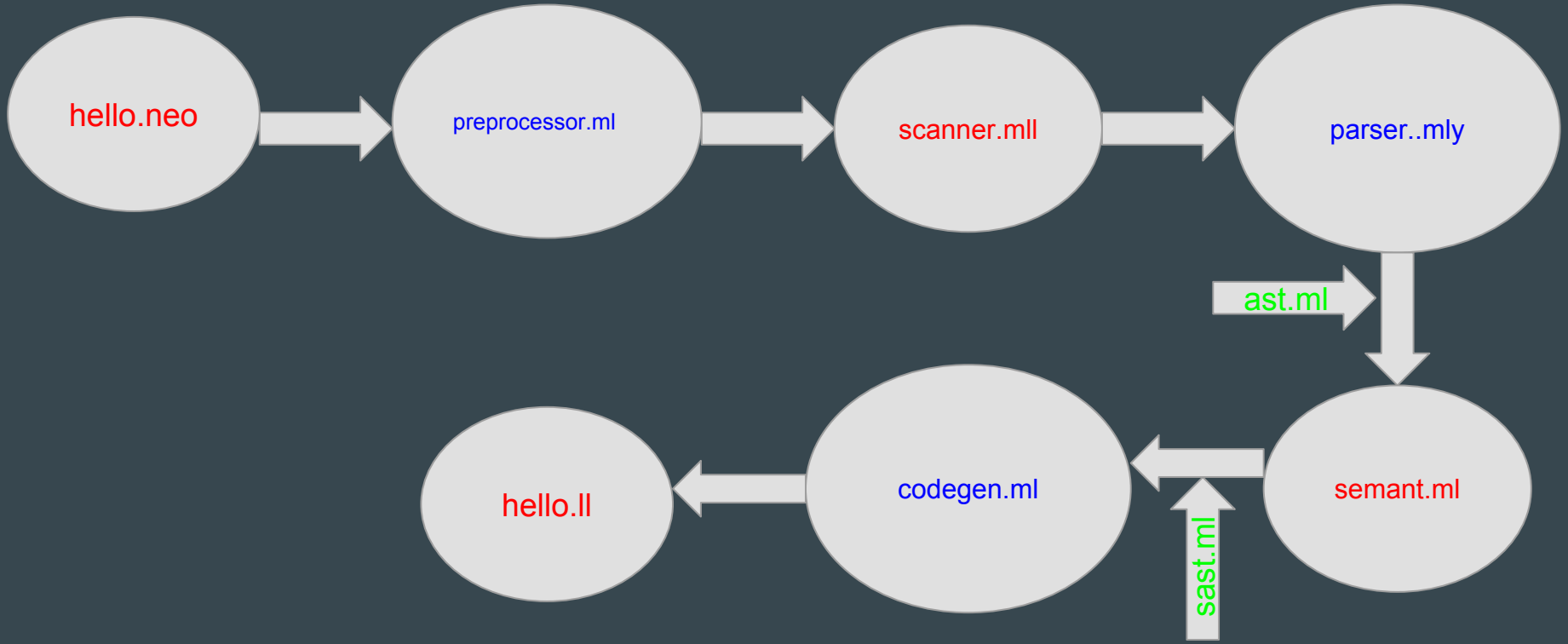
Some Other Very Interesting Features That We Want To Share!!!

- ★ Automatically cast the results of binary operations into a float when we have one integer and one float
- ★ We can generate matrices of any dimension - even 11 dimensional matrices!!

Behind the Scenes

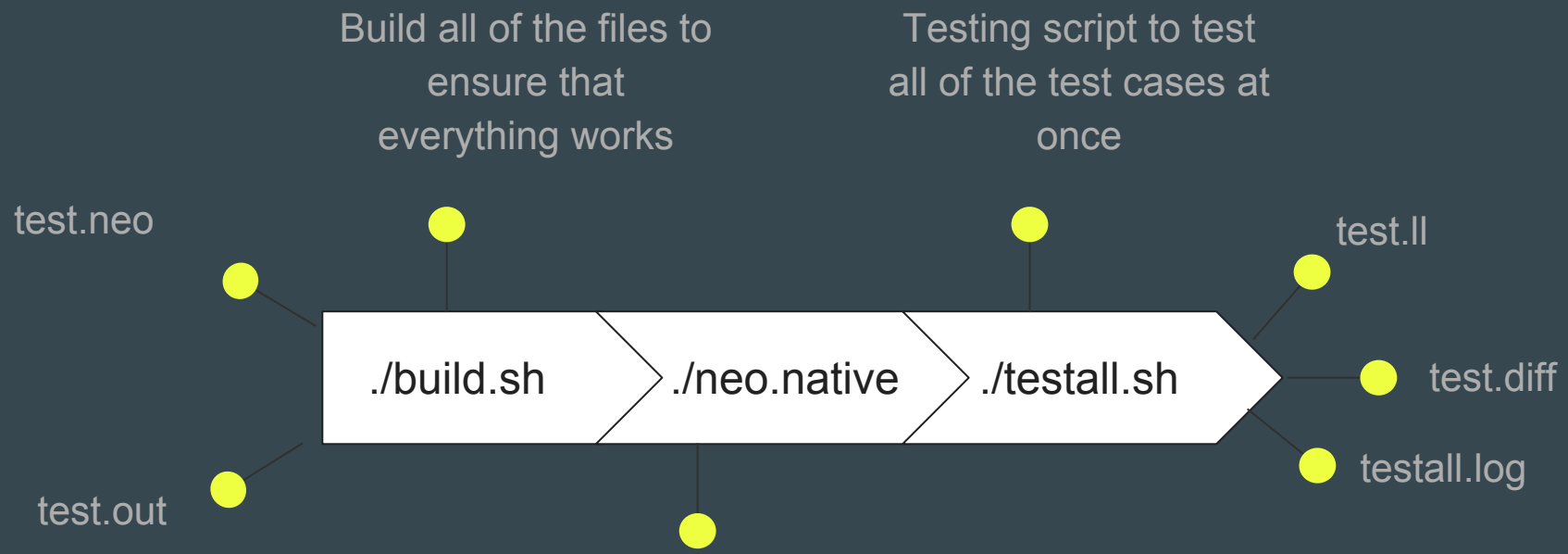
Compiling MatriCs

System Architecture



Testing in the Works

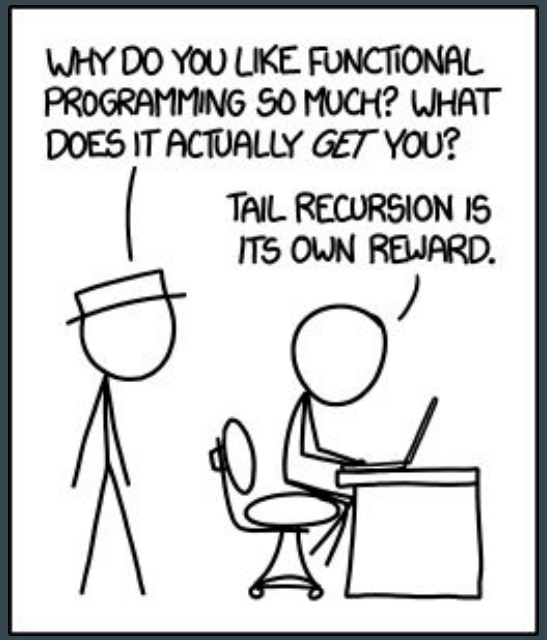
Ensuring That MatriCs Always Runs


Build all of the files to ensure that everything works
Testing script to test all of the test cases at once
test.neo
test.ll
./build.sh
./neo.native
./testall.sh
test.diff
test.out
testall.log
Ideal for running simple test cases or with single files - displays the ll file immediately after successful compilation

Meet the MatriCs People

“Yes we took the red pill to stay in Wonderland and see how deep the rabbit-hole goes”

Lessons Learned



Functional programming combines the flexibility and power of abstract mathematics with the intuitive clarity of abstract mathematics.

Lessons Learned

- Start as late as possible to learn about efficiency
- You definitely have to push your limits conceptually in terms of recursion. Downside is that when you try to brag about building a programming language no-one seems to know what that means....
- The LLVM documentation (the actual ones) is a black hole, you can spend your whole life trying to find the meaning of GEP...
- Simple things that you take for granted are often hard to implement

Show Time!!

Time to see MatriCs in action