PartialC

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Agenda

- Introduction
- Architecture
- Key Features
- Lessons Learned
- Demo

Introduction

Team Member

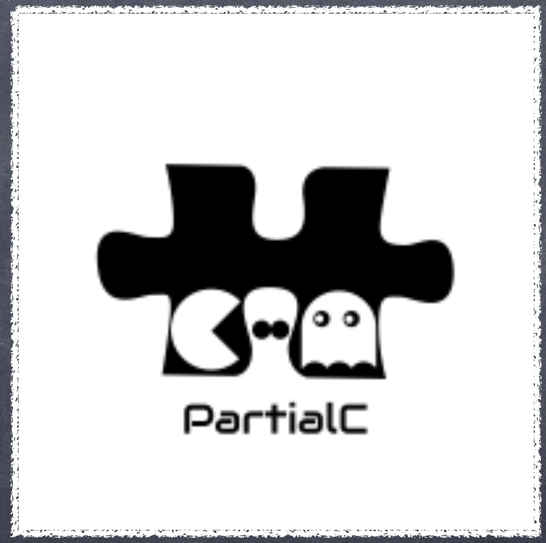
- Mingjie Lao: System Architect and Tester
- Jiaying Song: Manager and Language Guru

Inspiration

- Adopt data type Array to provide simple solution for dynamic programming
- Support user defined compound data types by introducing struct

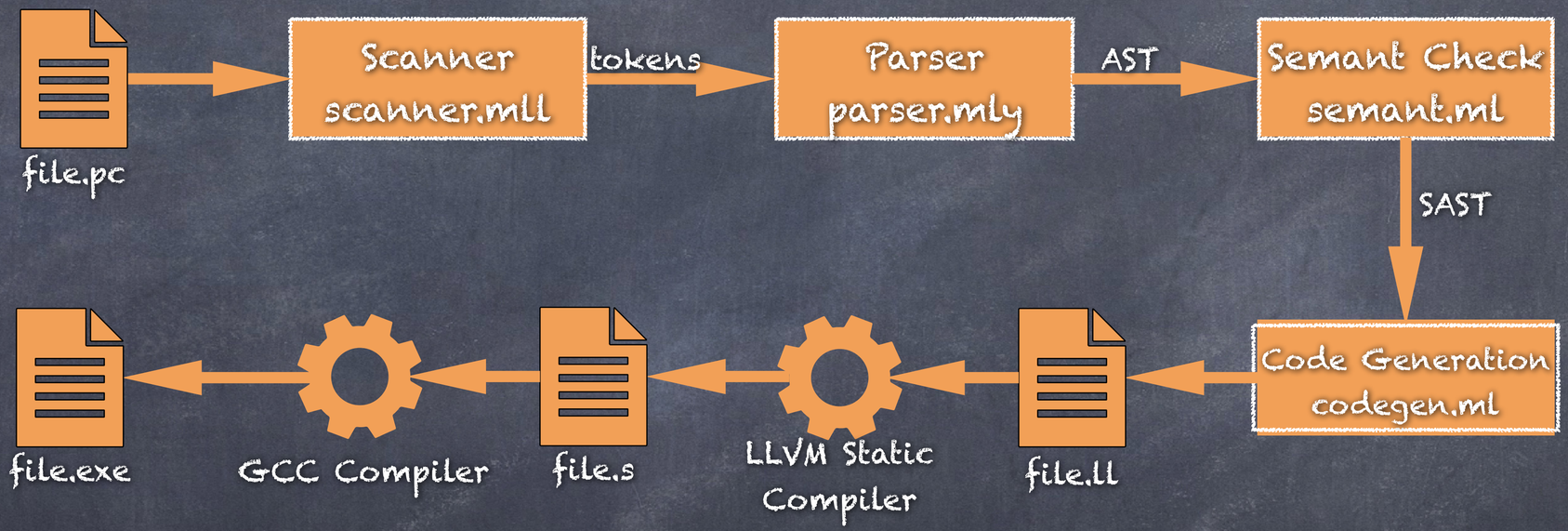
What is PartialC

- Imperative language with syntax similar to C
- Lightweight and easy to implement
- Support data structures such as Array and Struct



Architecture

Compiler Architecture



Key Features

Key Features - General

- Primitive data types: int, float and bool
- Compound data types: string, array and struct

```
void main(){
    int int_a = -8;
    int int_b;  //default value 0

    float flo_a = 2.0;
    float flo_b; //default value 0.0

    bool boo_a = true;
    bool boo_b; //default value true
}
```

```
struct Student{
 int sid;
 float grade;
 bool graduated;
};

void main(){
 string str_a = 'hello world';
 string str_b; //default is ''
 prints(str_a);

 arr int a = [1,2,3];

 Student x;
  x.sid = 1;
  x.grade = 4.5;
  x.graduated = false;
}
```

Key Features - General

- Basic control flow: if if/else while for

```
void main(){
    int a = 3;
    if (a > 1) {
        prints('correct');
    } else {
        prints('wrong');
    }
}
```

```
void main(){
    for(int a=1; a<5; a=a+1){
        printi(a);
    }
}
```

```
void main(){
    int a = 2;
    while(a > 1){
        prints('hello world');
        a = 1;
    }
    while(a == 1){
        prints('second hello world');
        a = 2;
    }
}
```

Key Features - General

- Support user-defined function
- Support recursion

```
void testcall(int b){
 b = b + 1;
 printi(b);
 if(b > 5){
  return 0;
 }else{
  testcall(b);
 }
}

void main(){
 int i=0;

 testcall(0);
}
```

```
void main(){
    int target = 9;
    arr int b[10];
    fib(b, target, 4.3);
    printi(b[9]);
}

void fib(arr int f, int t, float b){
    f[0] = 1;
    f[1] = 1;
    for(int i = 2; i <= t; i=i+1)
    {
        f[i] = f[i - 1] + f[i - 2];
    }

    printf(b);
}
```

Key Features - General

- Flexible variable declaration - NOT only at the top of function body

```
void main(){
    int a = -8;
    printi(a);

    float b = 1.2;
    printf(b);

    bool c = true;
    bool d = false;
}
```

Key Features - Array

- Array declaration in two ways: with length or with initial value

```
void main(){
    arr float a[8];
    a[7] = 8.0;

    arr int b = [1,2,4];
    b[1] = 9;
}
```

Key Features - Array

- Array are implemented for all primitive types: int, float and bool, as well as string

```
void main(){
    int a = [5, 2, 1];
    float arr b[8];
    bool arr[5];
    string arr d[9];
}
```

Key Features - Array

- Array out of bound check

```
void main(){
    arr bool a[7];
    a[7] = true;
}
```

```
[root@ac8e5a27e8af:/home/microc# ./single_test.sh
Fatal error: exception Failure("Array Index out ouf bound: 7")
/usr/lib/gcc/x86_64-linux-gnu/7/../../../x86_64-linux-gnu/Scrt1.o: In function `_start':
(.text+0x20): undefined reference to `main'
collect2: error: ld returned 1 exit status
./single_test.sh: line 4: ./test.exe: No such file or directory
```

Key Features - Array

- Pass by reference when doing function call
- sizeof built in function

```
void foo(arr int t){
    t[0] = 10;
}

void main(){
    arr int a[3];
    foo(a);
    printi(a[0]);
}
```

```
void main(){
    arr int a = [1,1,1,1,1];
    printi(sizeof(a));
}
```

Key Features - Struct

- Support members of primitive types: int, float and bool

```
struct Test{
    int a;
    float b;
    bool c;

};
void main(){
    Test x;
    x.a = 1;
    x.b = 4.5;
    x.c = true;

    printi(x.a);
    printf(x.b);
    if(x.c){
        prints('success!');
    }
}
```

Lessons Learned

- Project never ends! START EARLY!
- A simple feature implementation requires hours of debugging
- Parsing rules will determine the scalability of your compiler, design wisely
- Semantic check is fuzzy but really crucial at the same time
- OCaml is fun!

Demo