Scolang

LISTENER -> ACTION

A contract fulfillment language

Contents

1. Motivation and Background
2. Implementation Details
3. How it works
4. Development Strategy and learnings
5. Demo

Motivation and Background

- Scolang is a “Smart Contracts” based language, this means that a listener gets fulfilled and it triggers an action

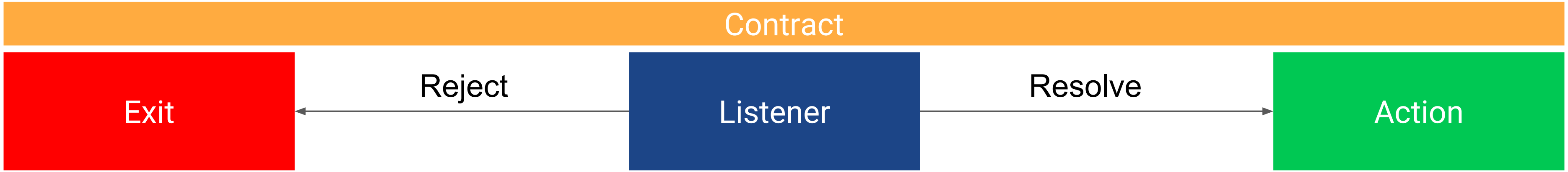
- Automate all the repetitive “IFTTT” tasks that users might have
  - Versatile use cases - IoT, Networking, Load balancing…

- Tried writing an “Alexa Skill” to turn on a phillips hue light and play some music = world of pain.

Implementation Details

1. Programming Paradigm
2. Data Types
3. Key inbuilt functions

Programming Paradigm



Declare multiple contracts in one script and they'll all be executed concurrently!

```
Listener b = { println (“I’m a listener!”); resolve; };

Action a = { println(“I’m an action!”); };

a -> b; /* This is a contract */
```

Data Types

Standard Data Types

Integer	32 bit signed integer
Boolean	1-bit Boolean variable
Float	64-bit Float
String	8 bit pointer

Scolang Types

Listener	Function Pointer
Action	Function Pointer
Contract	Integer

Key Inbuilt Functions

Purpose - Promoting IoT use case and versatility by allowing powerful contracts by having very open ended functions.

1. **Webhook(port_number)** : Opens a webhook at that port that's waiting for an input
2. **Query(query_details)** : Send a query to an endpoint of your choosing
3. **system_call(systemcall)** : Execute cmd commands on your system

Specifications

1. Statically scoped
2. Declarations must precede use/initialisation
3. Static types

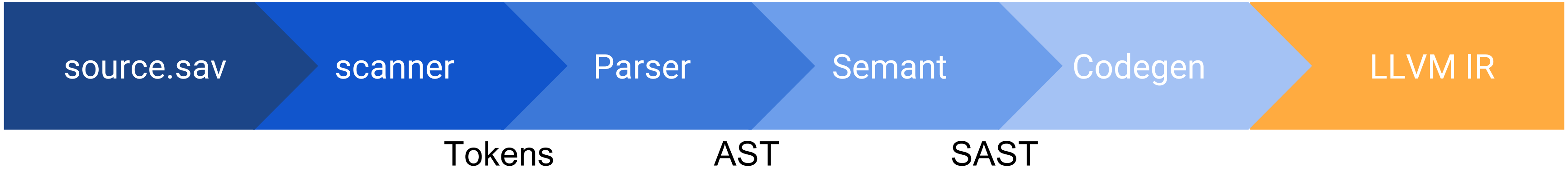
How it works : Under the hood

1. Listeners are essentially functions waiting to either die or return
2. Actions are also essentially functions
3. Whenever a contract is encountered, the listener-action pair is bound and forked into its own program, parent program returns to create more children.

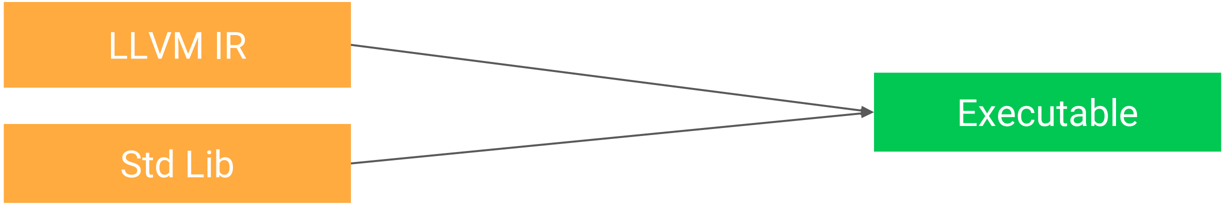
During codegen, the compiler walks through the AST, casts actions/listeners to functions and then prepares the binding by calling a C-function we wrote that manipulates the pointers to execute sequentially

Compiler Architecture

Ocaml Compiler



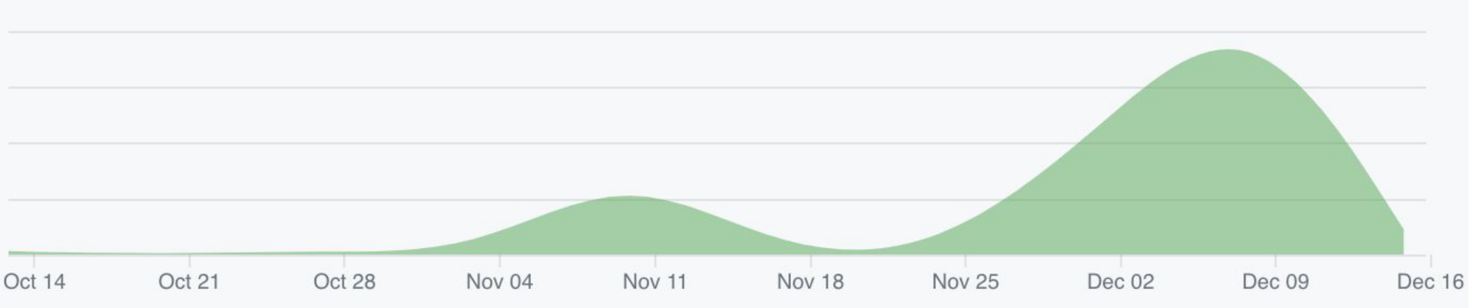
IR to Executable



Development Strategy

1. Testing in Travis CI + Shared VM for inspection
2. Environment Preservation using Docker
3. Written in OCaml, Python, C
4. Communication and Task Management via Trello and Messenger

Timeline



B-Weekly sprints before due dates

Learnings

1. Start early and use the regression testing suite as much as possible
2. Don’t waste time on things that are not the compiler(wasted a lot of time on travis CI)
3. Be less ambitious (We originally wanted to have algebraic expressions across listeners and chaining)
4. Team work makes the dream work - contribution % was near 20% for all 5 members.

Demo

- Solving the problem that initiated this entire project
  - Writing an alexa skill to turn on the lights and play some music.

Sushanth Raman	All rounder
Jackson Chen	Language Guru
Sambhav Anand	Architecture
Varun Varahabhotla	Project Manager
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