Initial Project Description

Team 15 – Ethan Grantz, Joshua Jeng, Garrett Mills, Abhigyan Saxena, QiTao Weng

Project Name

IntEarthNet using Swarm

Project Synopsis

Swarm will be a small domain-specific language for distributed computing, used to build IntEarthNet, an "internet health check" portal that shows global network speeds.

Project Description

Nearly all frameworks for distributed computing rely on external libraries for existing language to retrofit intra-machine communication using things like MPI. While these work, the integration can be clunky and requires the programmer to have some understanding of the inner working of the library they are using. Furthermore, most of these libraries have no logic for scheduling which nodes the code will run on by feature, instead relying on external schedulers to allocate the nodes beforehand. By contrast, Swarm is distributed by default. Code blocks and iteration is natively parallelized by default, and the logic for synchronizing results and sharing data structures is built into the language natively. Swarm also schedules its resources internally based on declarations of what resources are provided by which nodes. This not only removes the need for an external scheduler, but also requires the programmer to have less of an understanding of the underlying distribution logic and sync mechanisms. We want to use this DSL to build IntEarthNet, a web portal displaying internet access health around the world by using Swarm to run a suite of network tests on nodes around the world. For the final prototype for this class, Swarm should be able to lex, parse, and interpret basic code to execute an external script, aggregate the results, then store them in a shared database. IntEarthNet will read from that database and display the up-to-date metrics on a virtual globe.

Project Milestones

Sem 1:

1. Setup environment (tools, language, schema) (9/30)
2. DSL Feature List, Syntax, and Grammar (10/16)
3. Website UML Diagrams (10/16)
4. Complete Lexer (11/27)
5. Complete front-end UI (11/27)

Sem 2:

1. Complete Parser (1/29)
2. Complete Interpreter (3/30)
3. Complete ping report program (4/29)
4. Final Integration with global servers (5/6)
5. ML Proof of concept (5/6)

(See last page for Gantt Chart)

Project Budget

Development server

VPS	Monthly price	Months	Total
Google Cloud Compute	$12	8	$96

International servers according to most popular local hosting services ($12/mo per server approx.) These are used in the final IntEarthNet report which will use VPS local to the region to ping and download pages from top sites in the region to measure latency and packet loss at any given moment.

- At least one for each continent - except Antarctica
- Additionally subdivided by industrialization of different regions

Service	Approximate price
US AWS	$5
Brazil HostGator	$14
Germany Ionos	$2
Australia OVHCloud	$5
Ethiopia HahuCloud	$8
Total	$34/mo*

*Likely more as we add additional VPS for countries with vastly different economic development.

Total: $130

IntEarthNet

University of Kansas
Team 15

	Tue, 1/18/2022
Project Start:	Fri, 9/24/2021
Display Week:	1

TASK	ASSIGNED TO	PROGRESS	START	END
Semester 1				
Setup environment (tools, language, schema)	All	50%	9/24	9/30
DSL Feature List, Syntax, and Grammar	Garrett, QiTao, Joshua	20%	9/26	10/16
Website UML Diagrams	Ethan, Abhi	0%	9/30	10/16
Complete Lexer	Garrett, QiTao, Joshua	0%	10/16	11/27
Complete front-end UI	Ethan, Abhi	0%	10/16	11/27
Semester 2				
Complete Parser	Garrett, QiTao, Joshua	0%	1/18	1/29
Complete Interpreter	Garrett, QiTao, Joshua	0%	1/29	3/30
Complete ping report program	Ethan, Abhi	0%	1/18	4/29
Final Integration with global servers	Ethan, Abhi	0%	4/14	5/6
ML Proof of concept	All	0%	4/14	5/6