Nancy Xu: System Architect
Wanlin Xie: Project Manager
Yiming Sun: Language Guru
introduction
motivation

- Simple, concise domain-specific language for graph data analysis
  - Syntactic simplicity
  - Structural simplicity
- Out-of-the-box framework
  - Intuitive
- Standardized management of graph data under the hood
language features

- Node and Graph data types
- Useful standard library
  - Generic list, queue, pqueue data types
- User-defined data types
- Useful error messages
- Compilation to LLVM IR code
nodes and graphs
node
graph<string> g1;
g1 = new graph<string>();
graph

name: a
isVisited
data
outNodes
inNodes

g1~"a";
a.setData(0);
a.modifyVisited() = false;
print(a@data); /*prints 0*/
prints(a@name); /*prints a*/
graph

- name: a
  in
  out

- name: c
  in
  out

- name: b
  in
  out

- name: d
  in
  out

- g1~"b";
- g1~"c";
- g1~"d";
...
g1[1]->(a, b);
graph

- name: a
  - in
  - out

- name: b
  - in
  - out

- name: c
  - in
  - out

- name: d
  - in
  - out

$g1[1]->(b, a)$
standard library
generic collections

Lists

```c
list<int> a;
a = new list<int>(1,2,3);
a.l_add(4);
a.l_delete(0);

int x;
x = a.l_get(0);
print(x);
```

Queues

```c
Queue<float> a;
a = new Queue<float>();
a.qadd(3.1);
x = a.qfront();
printfloat(x);
```
user-defined data types
struct S1 {
    int x;
    string y;
}

int main() {
    struct S1 s1;
    s1.x = 32;
    s1.y = "hello world";
    return 0;
}
```cpp
struct S1 {
    int x;
    string y;
}

int main() {
    struct S1 s1;
    s1.x = 32;
    s1.y = "hello world";

    graph<string> g1;
    g1 = new graph<string>();
    g1.+"a";
    a = g1._a;
    a.setData(s1);

    return 0;
}
```
compiler architecture
Source Code → Scanner → Parser → AST

Semantics Checker

Code Generation

LLVM-Link

LLVM IR
Executable
demo: dijkstra’s
Dijkstra’s
dijkstra’s

<table>
<thead>
<tr>
<th>Vertex</th>
<th>Shortest Distance from Source a</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>0</td>
</tr>
<tr>
<td>b</td>
<td>1</td>
</tr>
<tr>
<td>c</td>
<td>2</td>
</tr>
<tr>
<td>d</td>
<td>3</td>
</tr>
</tbody>
</table>