Aphrodite

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The Basics

- Image Processing
- Imperative and Compiled Language
- Manipulate quickly and easily

Audience
  - Average computer users
  - People with many images
Motivation

- Many mundane, repeated tasks
  - Cropping all images in a directory
- Hard to manipulate collection of images easily
- Programming and image processing software is difficult without experience
Properties

- Easy syntax
  - C / Java commonalities
  - Functions not required
  - No semi-colons
- Web-savvy

- Powerful
  - Built-in support
- Extensible
Running Example
Syntactic Constructs

- Basic Types
  - int, double, string
- Complex Types
  - image, pixel
- Conditional Statements
  - if/elseif/else
- For Loops
- Image manipulation functions

- Special === operator
- +, -, *, = on images
- Functions
  - not required
Example

1) Image \( i = "http://www.cs.columbia.edu/~aho/aho.jpg" \)
2) show(i)
3) show \( i+100 \)
4) show scale i 1000 1000
5) show rotate i
Architecture

- .afro program
- Lexer: tokens
- Parser: C++ IR
- Symbol table
- Image Magick
- g++: C++ IR
- C++ exe
Example

in.afro

Image i = "http://www.cs.columbia.edu/~aho/aho.jpg"
show(i)
show i+100
show scale i 1000 1000
show rotate i

out.cpp

#include "functions.hpp"

using namespace std;
using namespace aphrodite;

int main(int argv, char **args)
{
    Image i = imageFromPath(( "http://www.cs.columbia.edu/~aho/aho.jpg" ));
    displayImage(( (i) ));
    displayImage(addConstant(i, (100)));
    displayImage(scaleImageCustom(i, (1000), (1000)));
    displayImage(rotateClockwise(i));
}
Testing Phases

A known bug is better than an unknown feature. (Manoj Sati)

- Does the lexer scan correctly?
- Is the grammar really working?
- Testing our function library
- Unit testing
- Integration and Regression testing
  - interaction between units and backward compatibility
- Black Box testing
Test Case Example

.afro program

output after compilation

expected output

pass this test if equivalent, otherwise fail
Tools

● Development
  ○ C++
  ○ UNIX
  ○ Flex
  ○ Bison
  ○ CppUnit
  ○ Google Code: SVN
  ○ ImageMagick with Magick++

● Support
  ○ Google Groups: Batch messages
  ○ Google Docs: Collaboration and sharing
Project Evaluation

- What Went Well
  - Group unity
  - ImageMagick integration
  - Brainstorming

- What Didn't
  - Getting started
  - Learning new applications (SVN, Flex/Bison)
  - Error handling and scoping
Lessons Learned

● Plan ahead! Start early!

● Time management

● Scheduling meetings is NP-complete

● Long-distance communication tools for commuters

● Diverse group: learned a lot about each other's culture

● Don't take Algorithms :)
“Even if you gods, and all the goddesses too, should be looking on, yet would I be glad to sleep with golden Aphrodite”

-Homer (8th century)