Kevlar

A User-Friendly, Type-Safe, Graphical Shell

A third year group project by
Tristan Allwood, Daniel Burke, Marc Hull, Ekaterina Itskova and Steve Zymler

Overview

- Background
- Motivation
- Specific usability issues solved
- Usability study
- Future work
- The next step
- Conclusions

Background

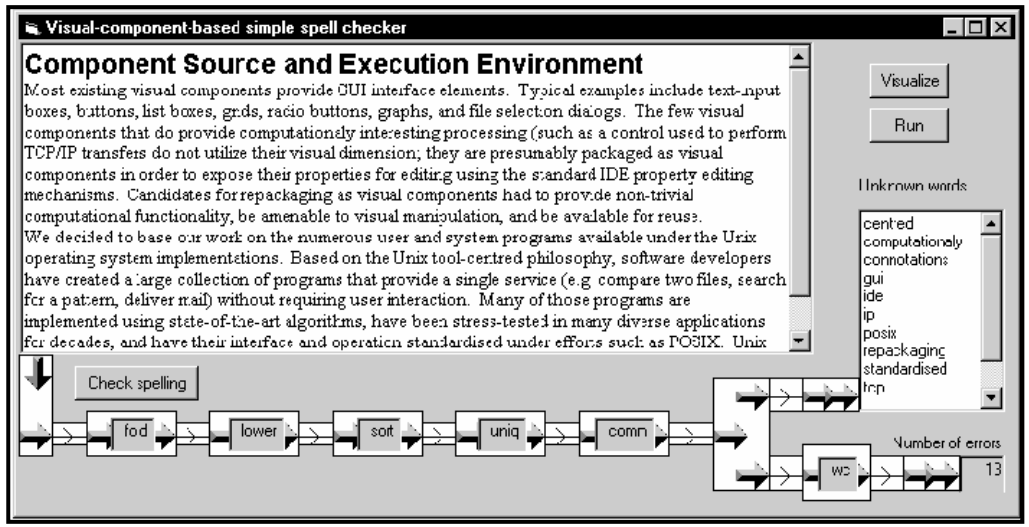
- What is a command shell?
- What is a pipeline?
- What is Kevlar?

Motivation

- What Kevlar solves:
  - Program discovery
  - Consistent Help
  - Argument validation
  - Typed pipes
  - Flexible piping

Hasn't this been done before?

- PURSUIT
- VUFC
- Piper
- VisiQuest
- MEProf



Case Study: Image Manipulation

- Aim:
  - Load a directory of images
  - Resize the images to thumbnail size
  - Display the images before and after

The command line

```
ls *.png | sed ‘s/\.png$//’ | xargs –ri convert
   ‘{}’.png –resize 100x100 /tmp/’{}’-
   thumb.png && gimp /tmp/*-thumb.png
```

Program Discovery

- What is the problem?
  - Finding the right tool for the job
  - Remembering the tool
- How does Kevlar solve this?
  - Sophisticated keyword-based search
  - Standardised help for programs
  - Categorised programs
  - Complete auto-complete

Argument Validation

- What is the problem?
  - Invalid arguments are not detected until execution-time
- How does Kevlar solve this?
  - Construction time parsing and validation of user arguments
  - Immediate visual feedback for mistakes
  - Execution disabled until the pipeline is valid

Typed Pipes

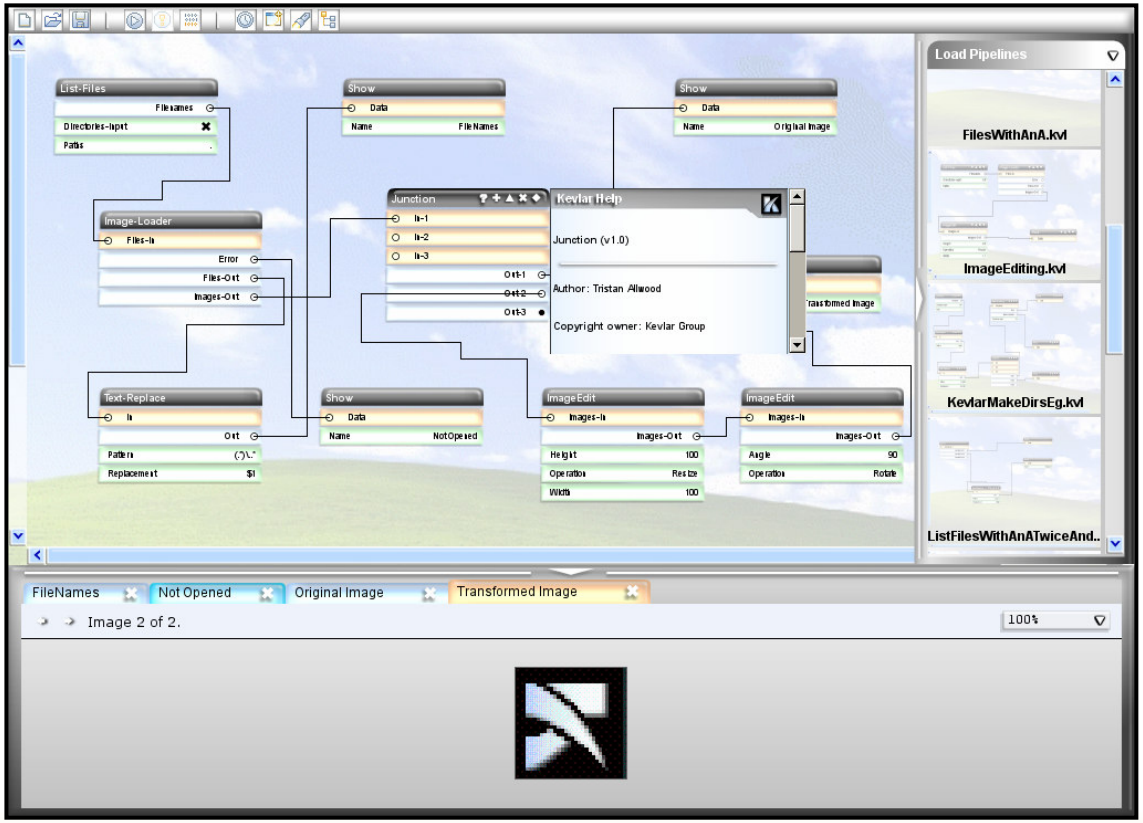
- What is the problem?
  - The command line only knows about binary data
  - There is nothing to stop users from creating a semantically invalid pipeline
- How does Kevlar solve this?
  - All pipes are typed and are valid for type safety

Flexible Piping

- What is the problem?
  - Programs can only have one or two useful input and output pipes
- How does Kevlar solve this?
  - Programs can have multiple named (and typed) input and output pipes

Kevlar: More than a shell?

- Macros
- Saving
- Loading
- History
- Dynamic addition of programs



Tristan Allwood, Daniel Burke, Marc Hull, Ekaterina Itskova and Steve Zymler

Usability Study

- We set six tasks for users to complete
- We received feedback on the user experience
  - Some adjustments to the interface were made as direct feedback to this study
  - Ideas for future extensions were borne out of the study

Usability Study: Implemented Improvements

- “No feedback that the pipeline was saved”
- “if you RIGHT-click on the program, help should appear”
- “do NOT make us click on the circle to select it, clicking anywhere on the name should suffice”
  - With respect to program IO nodes.

Usability Study: Future Suggestions

- “Make it run fast =)”
  - Execution
  - GUI response
- “the way to connect different parts isn’t so clear.” (With respect to program IO node types)
  - Visualisation of types and type tree
  - Help finding programs based on IO types

Usability Study: Positive Feedback

- “I would use Kevlar for large tasks instead of a normal command line”
- “the program is very easy to use”
- “for tasks which take longer to execute the performance is … acceptable, I felt”
- “great improvement over the classic command line”

Usability Study: Evaluation

- We do recognise our results come from a limited set of results, and most replies were from ‘console experts’
- This does not devalue the study as it has identified usability issues with Kevlar that we have had a chance to improve

Extension Work

- Plug-in-able visualisers
- Scripts and control structures
  - Loops, conditionals
- Arguments visible in Macros
- More Help
  - Tutorials, tool-tips, program discovery based on IO type

The Future of Kevlar

- Generic work-flow framework
- Distributed program discovery and execution
- Kevlar integration into Operating Systems?

Group Conclusions

- Communication a key factor to success
  - Negotiating interfaces
  - Group motivation
  - Teaming people together
- Importance of build systems and working environment
  - Constant integration
  - Instant feedback from other group members

Acknowledgements

- Paul Kelly
- Susan Eisenbach
- Robert Chatley
- Our usability study volunteers
- Matthew Sackman
- Eric
  - For being there

Kevlar: A User-Friendly, Type-Safe, Graphical Shell

Tristan Allwood, Daniel Burke, Marc Hull, Ekaterina Itskova and Steve Zymler