OpenDragon Programmer's Toolkit:
A Framework for Learning Geoinformatics Software Development

Sally E. Goldin & Kurt T. Rudahl
King Mongkut's University of Technology Thonburi
Bangkok, Thailand

OpenDragon Project

American Society for Photogrammetry and Remote Sensing Annual Conference
8-13 March 2009

Progress in Geospatial Information Processing

- More data sources, higher resolution
- Improved hardware and connectivity
- Emerging standards
- Advances in software: algorithms and architectures

But...

- Most geospatial professionals know little or nothing about software development
- Most programmers have no understanding of geographic concepts

The OpenDragon Programmer's Toolkit can help to bridge these knowledge gaps.

What is OpenDragon?

- Turnkey remote sensing/raster GIS package designed for teaching and research
- Simple, easy-to-use, focused on step-by-step access to core geospatial analysis capabilities
- OpenDragon is a free version of the commercial Dragon/ips® software system
- OpenDragon is available for download by educational organizations in Southeast Asia at http://www.open-dragon.org

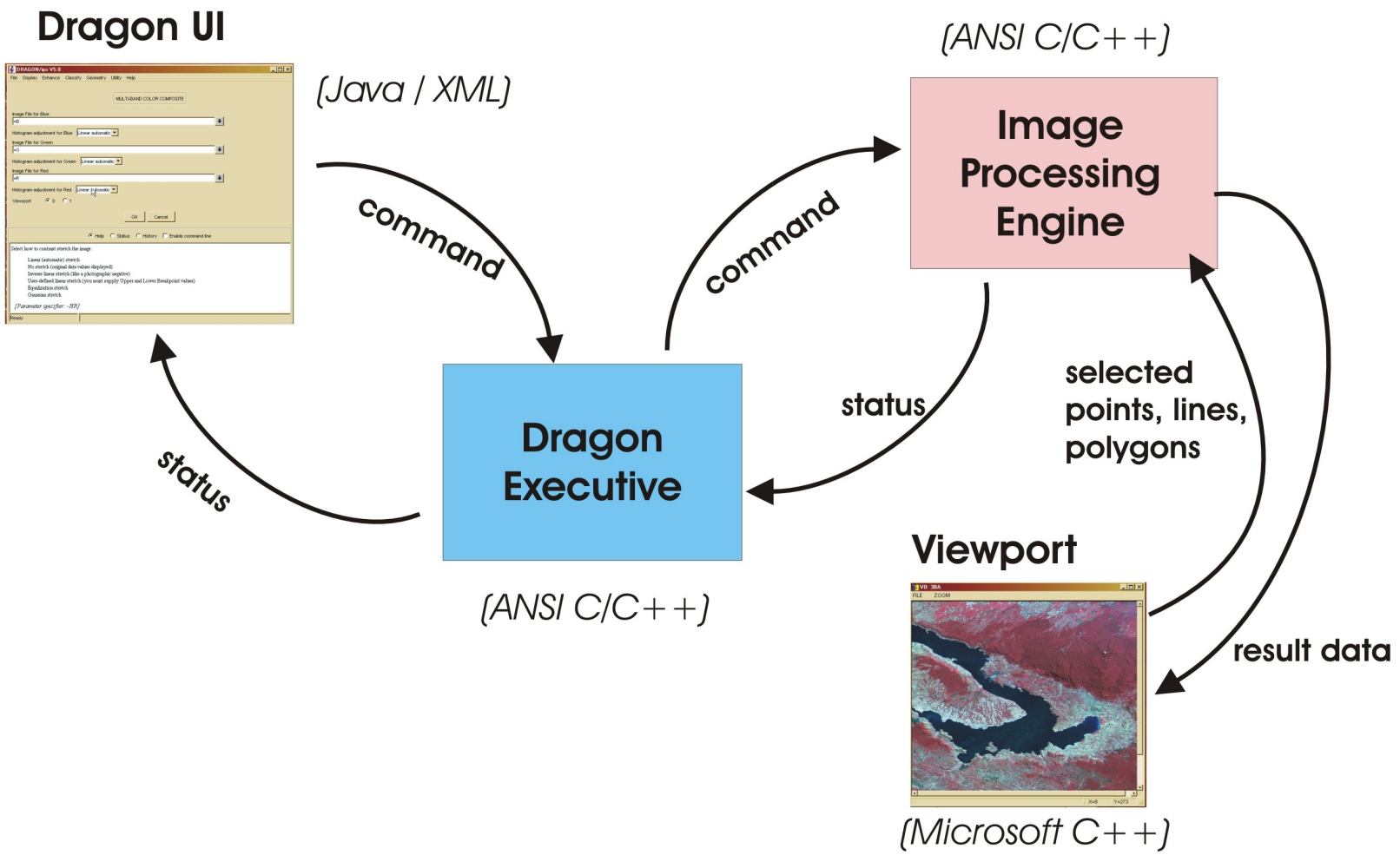
What is the Programmer's Toolkit?

- Libraries, header files, sample programs and HTML documentation
- Allows users with a beginning knowledge of the C programming language to extend OpenDragon
  - New data import/output routines
  - Well-known operations not in the basic package
  - Novel or experimental geospatial processing methods

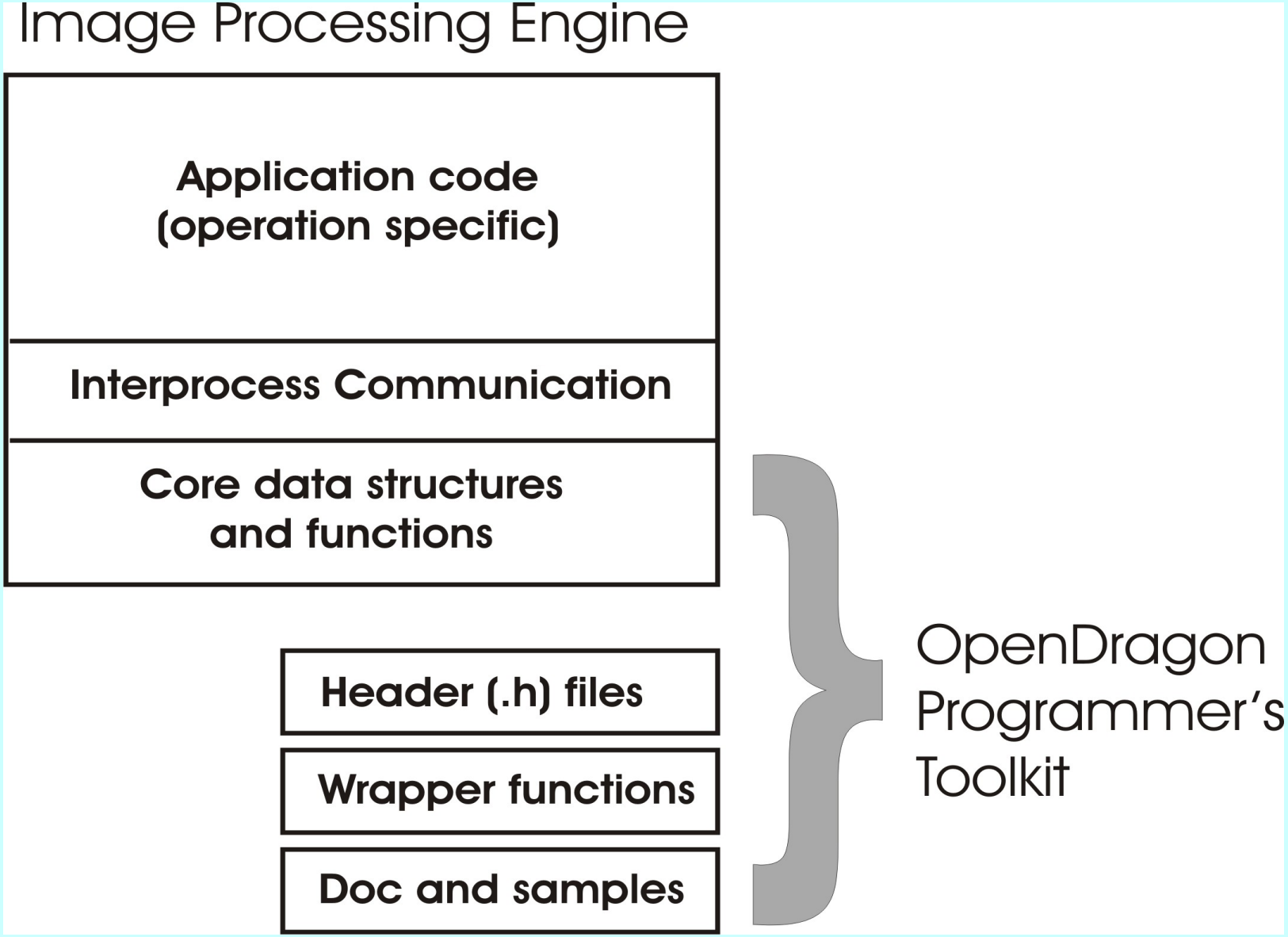
Who can use the Programmer's Toolkit?

- Engineering or computer science students who typically know how to program but do not understand spatial data structures and manipulation strategies
- Geography students who typically understand spatial concepts but know little about how to manipulate raster or vector data in a computer program
- Researchers who want to test original algorithms

Dragon Architecture



How does the Toolkit fit in?



What can you build?

- Currently, anything created with the Toolkit will be a standalone executable.
- Mechanisms exist for integrating new functions into the Dragon User Interface.
- However, these mechanisms are not yet publicly available.
- OpenDragon is currently a Windows program. However, a Linux version of the Toolkit is available on request.

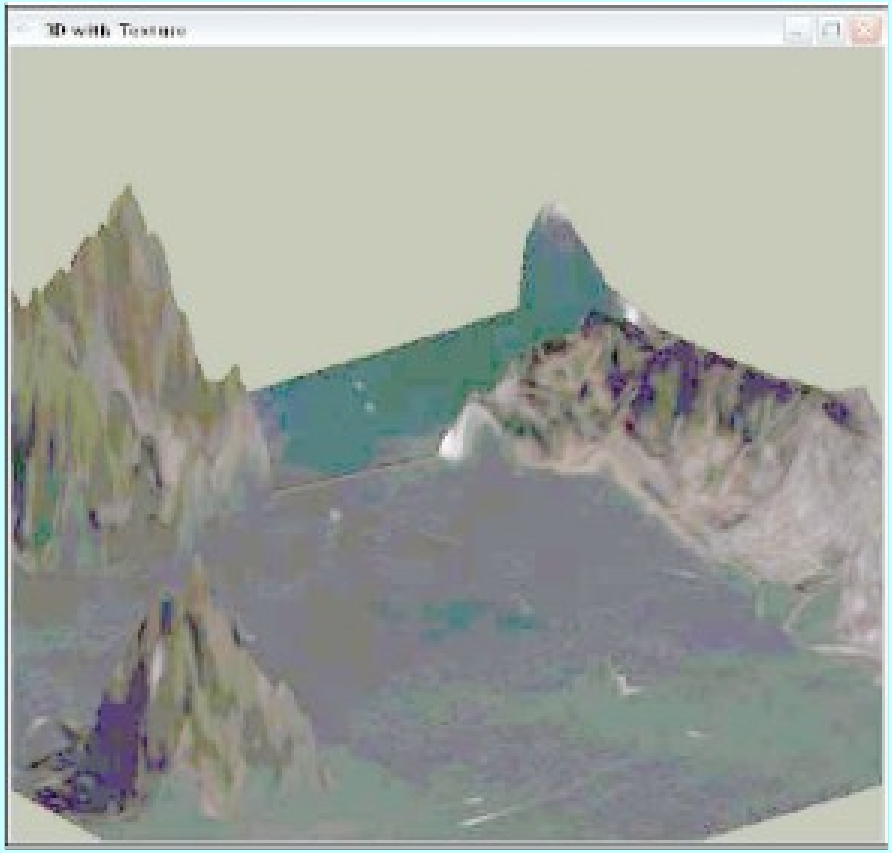
Our experiences at KMUTT

- Undergraduate projects
- Graduate research
- Course work for both computer engineering and geography students

Example Senior Project

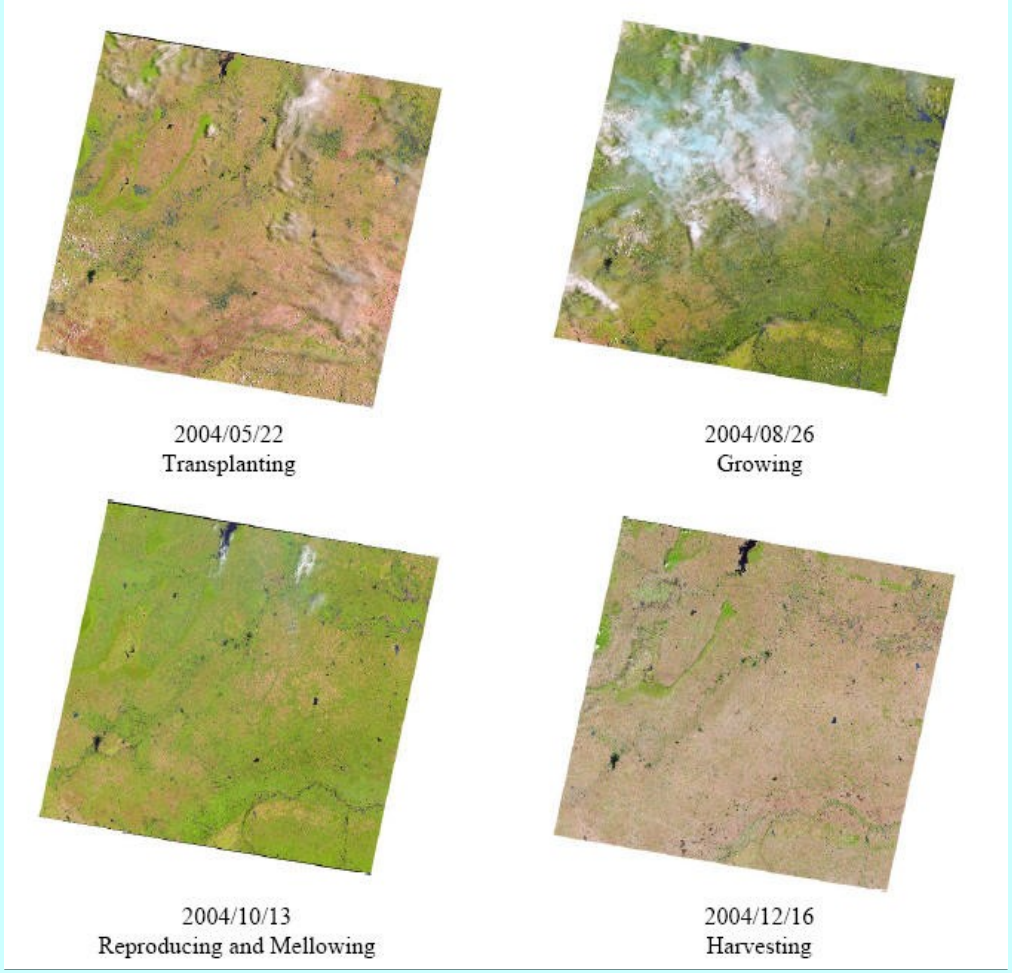
"Generation and Animation of Perspective Views"

- Students created an application to read a DEM, then create and display a perspective view draped with a satellite image.
- Programmer's Toolkit was used for image input and output and to visualize image data in 2D.



Example Masters Thesis

"Improving Rice Classification using Multitemporal Data with Fuzzy Logic and Genetic Algorithms"



- Mr. Ithiphol Ekhahitanonda wrote a suite of programs to define and optimize fuzzy rule sets for classifying rice from multitemporal ETM data
- Programmer's Toolkit used for pre-processing, data input and output and core algorithms
- OpenDragon was also used for image registration, vector overlay, and max likelihood classification to compare with novel methods

Courses

- Algorithms and Architectures for Geoinformatics
  - Computer Engineering seniors and grad students
  - Lectures focusing on spatial concepts
  - Two sets of group projects using Programmer's Toolkit
- Computer Programming for Geoinformatics
  - Masters level students in Department of Geography
  - No prior programming experience, but familiar with geographic concepts (scale, coordinate systems, raster and vector representations)
  - 50% of course was lab time, working on programming exercises

Programming for Geographers

Geographers need to know about how software works:

- Write simple data translation routines
- Create “glue” to integrate different applications
- Understand and evaluate commercial packages

GLaK Geoinformatics Laboratory at KMUTT

Conclusion

- A variety of packages are available for teaching geoinformatics at the undergraduate and graduate level.
- Most if not all are application-oriented. There are few tools available to support learning about how to develop geoinformatics software.
- OpenDragon provides a testbed for research and a framework for hands-on class projects.
- OpenDragon reveals the inner workings of geoinformatics software to students of today, helping build the skills of those who will develop the spatial analysis software of tomorrow.

Thank you for your attention

Contact Information

Email:

seg@goldin-rudahl.com

OpenDragon website:

http://www.open-dragon.org

Dragon/ips website:

http://www.dragon-ips.com

GLaK website:

http://www.cpe.kmutt.ac.th/glak