

## *The CCD Image Server*

**Brian J Tieman**

Beamline Controls and Data Acquisition  
Advanced Photon Source



THE UNIVERSITY OF  
CHICAGO



**Office of  
Science**  
U.S. DEPARTMENT OF ENERGY

A U.S. Department of Energy laboratory  
managed by The University of Chicago



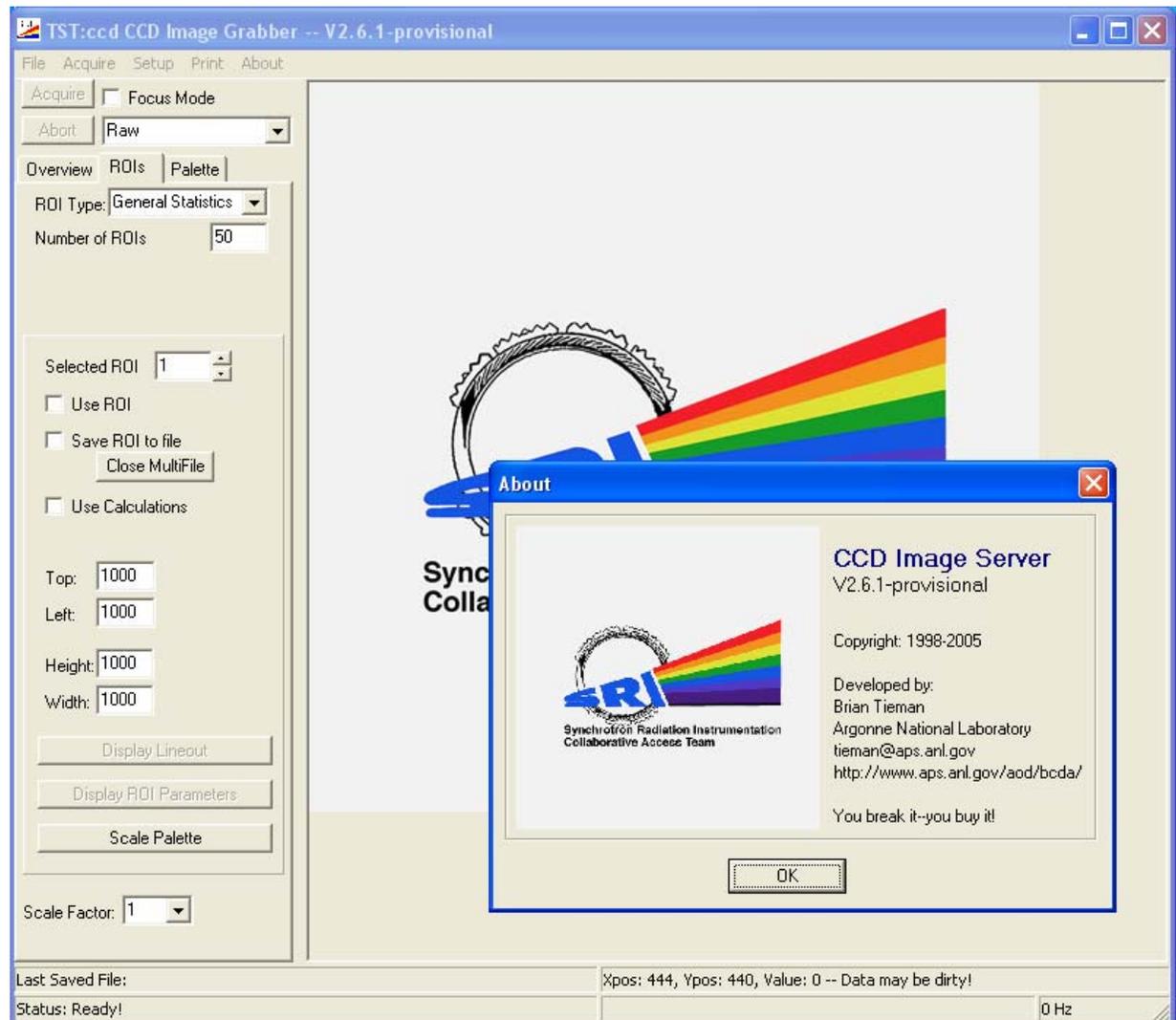
# Introduction

- **History**
- **Capabilities**
  - EPICS Portable Channel Access Server
  - Camera Models
  - General Feature Set
- **Extensibility**
  - New Cameras
  - New Features
- **Contact Information**



# History

- **Which sector is SRICAT?**
- **Designed for...**
  - 1 camera
  - Tomography
  - 2 beamlines
- **Original Design**
  - IDL
  - Camera control
    - *ActiveX*
    - *Native C Wrapper*
  - Experiment synchronization via EPICS Client handshaking
- **First Major Rewrite**
  - Borland C++ Builder
    - *Better GUI*
    - *Easier access to camera API*
  - Portable Channel Access Server???



# History Continued...

## ■ Free Electron Laser

- Dropped all beamline support for 3 months!
- Portable Channel Access Server—no other choice now!
  - *20 cameras—all very remote*
  - *Roadrunner Bitflow framegrabbers—Windows only*

## ■ Back to the Beamline

- PCAS working very well—a new hammer!
- Other cameras?
- Other experiments?

## ■ Second Major Rewrite

- Class structure for camera driver support
  - *Easily add new camera support by writing new device object*
  - *Duh!*
- Class structure for ROI type support
  - *Different calculation sets*

## ■ Third Major Rewrite...

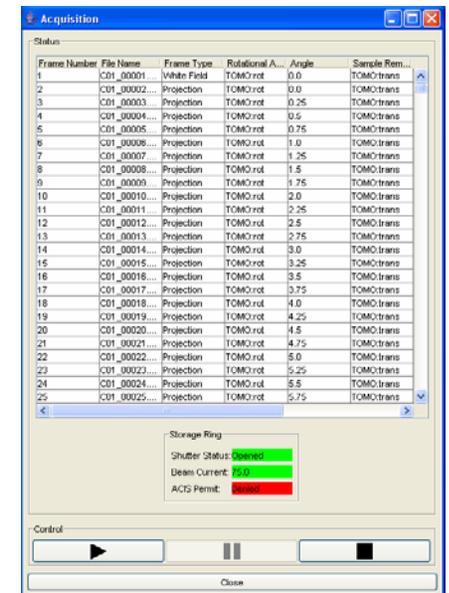
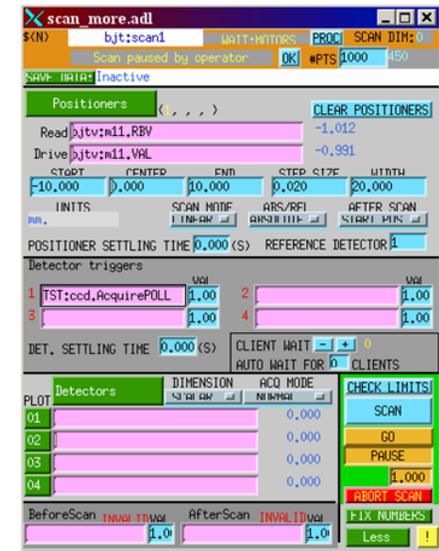
# Capabilities—EPICS Portable Access Server

## ■ Why Portable Channel Access Server?

- Server support gives better performance
- SoftIOC wasn't available
- Application first approach
  - *Easier development path*
  - *No database support*

## ■ How does it work?

- Separate thread
- Turns shared application memory into PV
- Handles all EPICS communication
  - *EPICS\_Get—returns shared memory value to client*
  - *EPICS\_Put—passes client value to application via callback*



# Capabilities—Camera Models

## ■ Test Pattern

- Requires no hardware
- Used for development/testing

## ■ Princeton Instruments/Acton

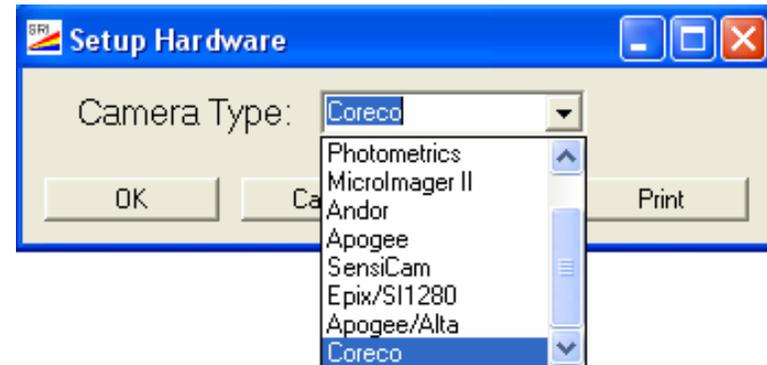
- Entire Line
  - *VersArray*
  - *CoolSnap*
  - *Quantix*
  - *Etc...*

## ■ Apogee

- ActiveX interface
  - *Alta*

## ■ Cooke

- SensiCam



## ■ Frame grabbers

- Epix
  - *SI1280*
- Coreco
  - *SI1280*
  - *SI3170*
  - *Sarnoff*

# Capabilities—General Feature Set

## ■ General Feature Set

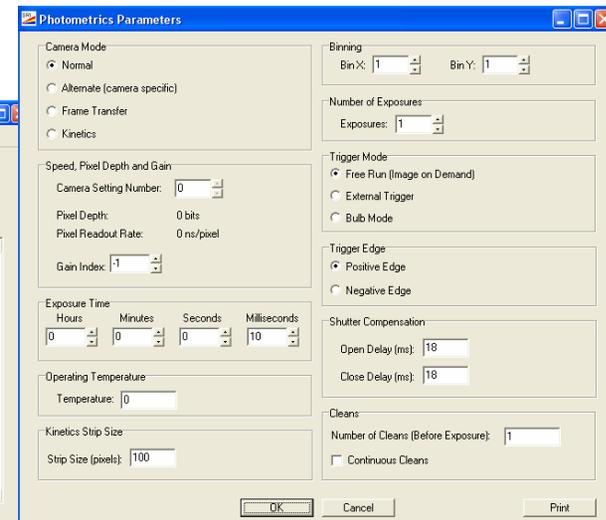
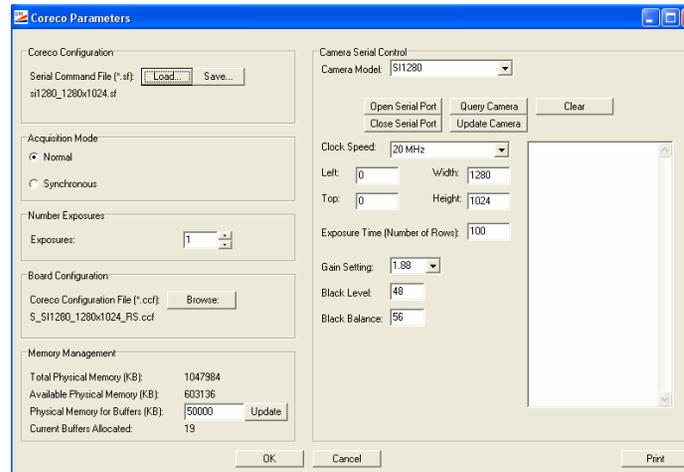
- EPICS PVServer
- Multiple ROIs
- Integrated ROIs
- Multiple Color Palettes
- Palette Scaling
- Image Scaling for Display
- Background Subtraction for Display and Calculations
- Buffered Memory Mode for Higher Performance Acquisition

## ■ Calculations

- Minimum Pixel Value
- Maximum Pixel Value
- Average Pixel Value
- Pixel Sum
- FWHM
- Centroid
- Center of Mass
- Background Removal

## ■ Specific Camera Features

- Binning
- Temperature
- ADC
- Kinetics
- Etc...



# Extensibility

## ■ Further developments by request

- New camera support
  - *Need camera vendor interface*
  - *Need to develop a Device Driver for camera interface*
  - *Typical development time ~2 weeks*
    - ...there are exceptions...
- New feature support
  - *Lower priority than new camera support*
  - *Not all new feature requests will be supported*

## ■ Some planned developments

- More cameras
  - *Detector Pool cameras*
  - *Better Coreco support*
  - *XRadia*
  - *Whatever users ask for...*
- Performance tuning
  - *Been a long time...*
- Better Image display handling
  - *Additional capabilities*
  - *Less overhead*

## ***Contact Information:***

Brian J Tieman

Beamline Controls and Data Acquisition

Advanced Photon Source

[tieman@aps.anl.gov](mailto:tieman@aps.anl.gov)

(630)252-0141

