



DARK ENERGY  
SURVEY



# Image Builder/Data Handling System Design

Tao Qian  
UIUC

April 10, 2007



DARK ENERGY  
SURVEY



# Basic Structure

Image Builder/Data Handling System will consist of a Linux farm with a supervisor layer:

- DHS supervisor layer

- Coordinate the connections between PANs and DHS machine

- DHS

- Collect pixel data from PANs
- Combine pixel data with metadata
- Form FITS file and deliver file to downstream



# Basic Idea

1. DHS will consist of a set of Linux boxes
2. At any time, only one DHS machine connects with PANs
3. Connection between PANs and DHS are through sockets
4. DHS machine is server
5. PANs are clients
6. Clients push the pixel data and metadata into DHS
7. DHS stuffs the data into the shared memory



DARK ENERGY  
SURVEY



# Primary Processes in DHS

## 1. collector:

- Listens for connection from clients (PANs)
- Stuffs the pixel data and configuration into the shared memory
- Listens for commands from supervisor layer, reporting the current status (may need message bus)

## 2. sharedMemoryManager:

- Organize the shared memory cache
- Provide access pointer for other processes

## 3. pixelFeed

- Gather global metadata from database
- Assemble image from the shared memory into FITS format
- Send file to DTS through sockets



DARK ENERGY  
SURVEY



# Data Flow Testing (1)

- A toy model has been developed
- Client on (storm.des.hep.uiuc.edu) Pentium 4 Linux machine
- Server on (cyclone.des.hep.uiuc.edu) Pentium 4 Linux machine

Transferring data from a full PAN:

$\text{numCcd} = 9; \text{nx} = 2248; \text{ny} = 4146$

1 integer = 4 bytes

Total pixels =  $9 * 2248 * 4146 * 4 = 83,881,872 * 4$   
= 335, 527, 488 bytes

The data is equivalent to 9 CCD pixel data with 4 bytes per pixel.



# Data Flow Testing (2)

Ethernet card 10Mb/100Mb on both ends

Receive data : **335, 527, 488 bytes**

Packet size (bytes)	Action	Trial 1 (sec)	Trial 2 (sec)	Trial 3 (sec)	Average (sec)	Average Rate
4096	Recv	28.52	28.15	27.84	28.17	11.91 MBytes 95.28 Mbits
	&Saving	100	100	100		
8192	Recv	30.40	29.41	28.91	29.57	11.34 Mbytes 90.7 Mbits
	&Saving	100.13	104.88	102.89	102.63	

Total time =  $(30 \times 2) / \text{PAN} \times 5 \text{ PANs} = 300 \text{ seconds}$

**Need faster Ethernet switch !!!**



DARK ENERGY  
SURVEY



## Next Step

- Modify the client code and implant it into MONSOON
  - Link the correct dhsUtil.lib in MONSOON which will send data to DHS (may need to modify the monsoon library?)
- Develop the server
  - Develop based on DHS software from NEWFIRM
- Design DHS supervisor layer