PDS 4 Data Architecture
Part II (2)

PDS 4 Data Architecture Team

September 2008

Data Structure Approach

National Aeronautics and
Space Administration

- **Four Extremes**

    1. Only use externally defined structures.

    2. Develop a syntax to define data structure.

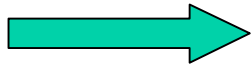   3. Clean-up and prune PDS3.

    4. Start fresh.

Data Structure Approach

- **Four Extreme Options**

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Data Structure Approach

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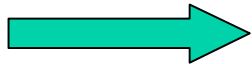
  4. Start Fresh.

Data Structure Approach

- **Four Extreme Options**

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    2. Develop a syntax to define data structure.

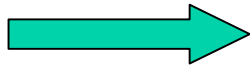   3. Clean-up and prune PDS3.

    4. Start Fresh.

Realistically we'll use a combination of 3 & 4 as our basis with some of 1 & 2.

A Straw Man

- **What would this look like?**
  - We'll look at a straw man of one possibility.

Design New Structures - A 'Minimalist Approach':

- Four simple "**Base Structures**"

- PDS supported "**Abstract Classes**"

- PDS supported "**User Classes**"
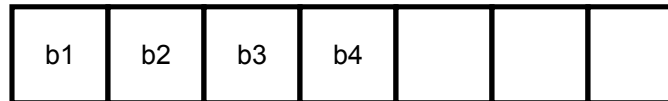
- PDS Designed Utilities.

Data – A Simple Example

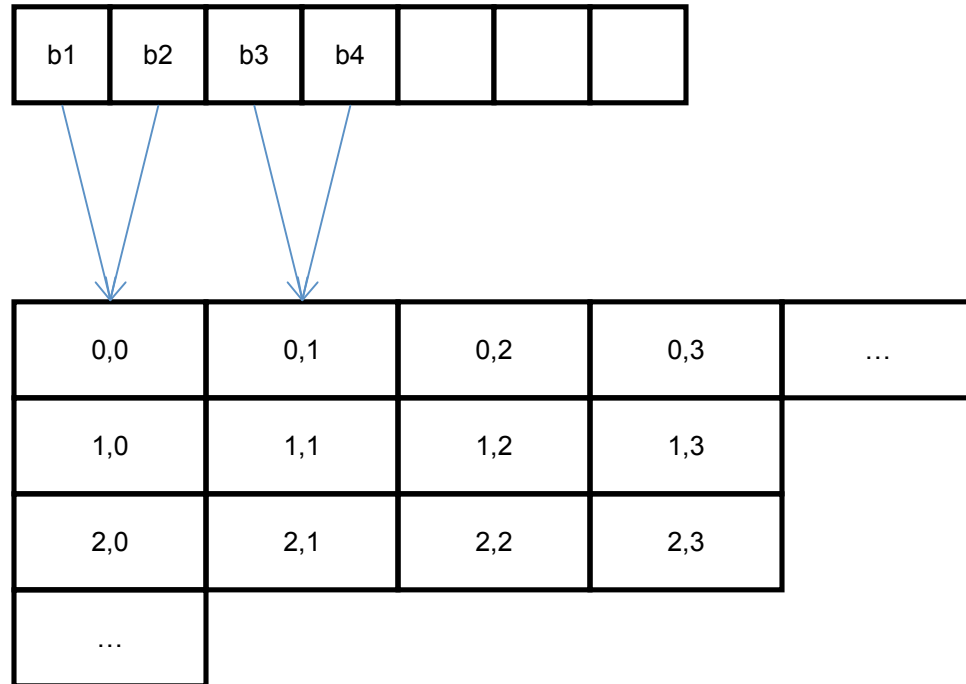| b1	b2	b3	b4			

- In the disk file, the data exists as a simple sequence of bytes.

- The lowest-level PDS utilities read the sequence of bytes into one of the basic storage structures.
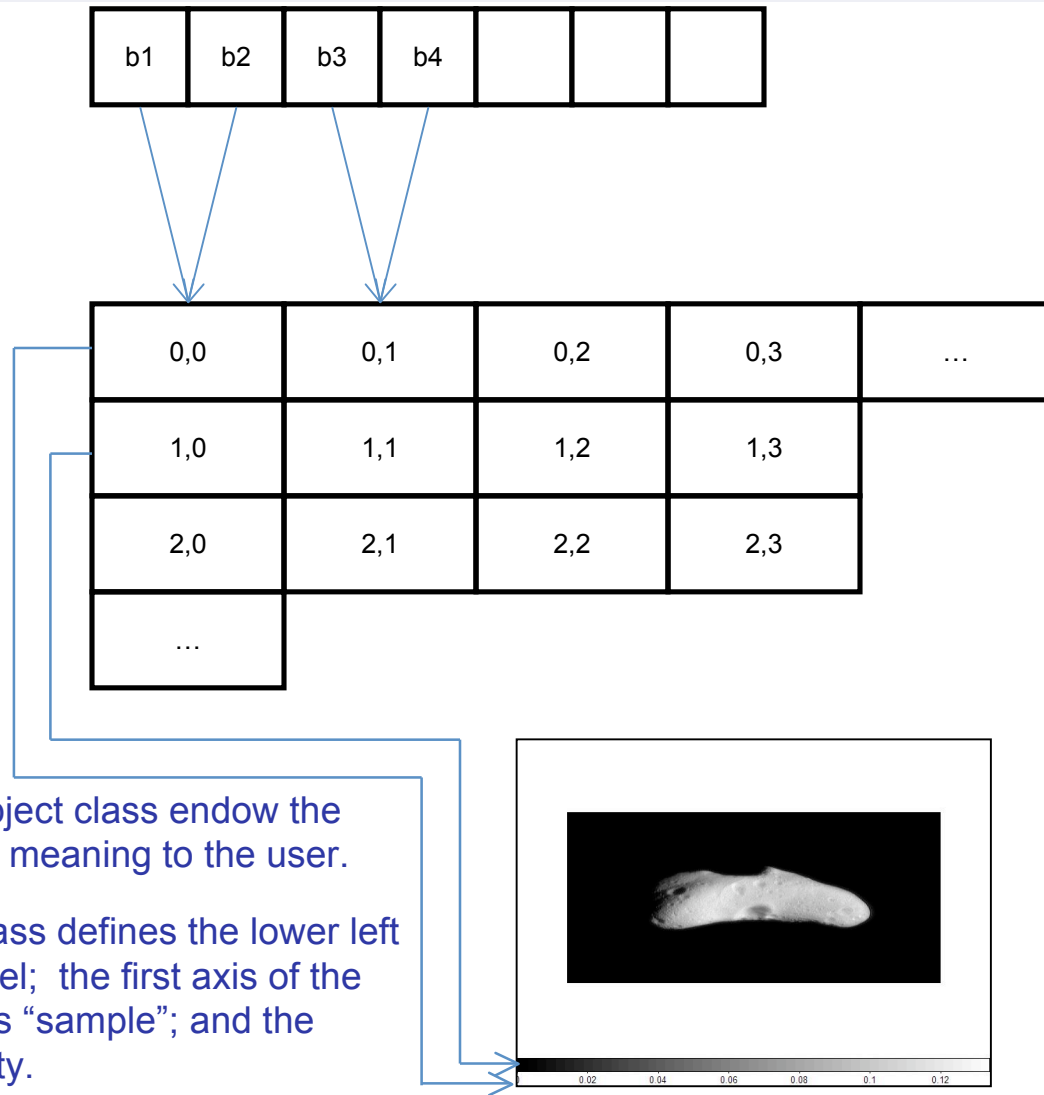
Data – A Simple Example

b1	b2	b3	b4			

- In the process of reading the file, the sequential bytes are interpreted into a storage structure in memory.

- In this case our memory storage structure is a 2-dimensional array of 2-byte integers, stored in row-major order.

- This structure and its attributes are defined as the basic n-dimensional homogeneous array (with an element type of MSB-I2).

0,0	0,1	0,2	0,3	…
1,0	1,1	1,2	1,3	
2,0	2,1	2,2	2,3	
…				

Data – A Simple Example

b1	b2	b3	b4			

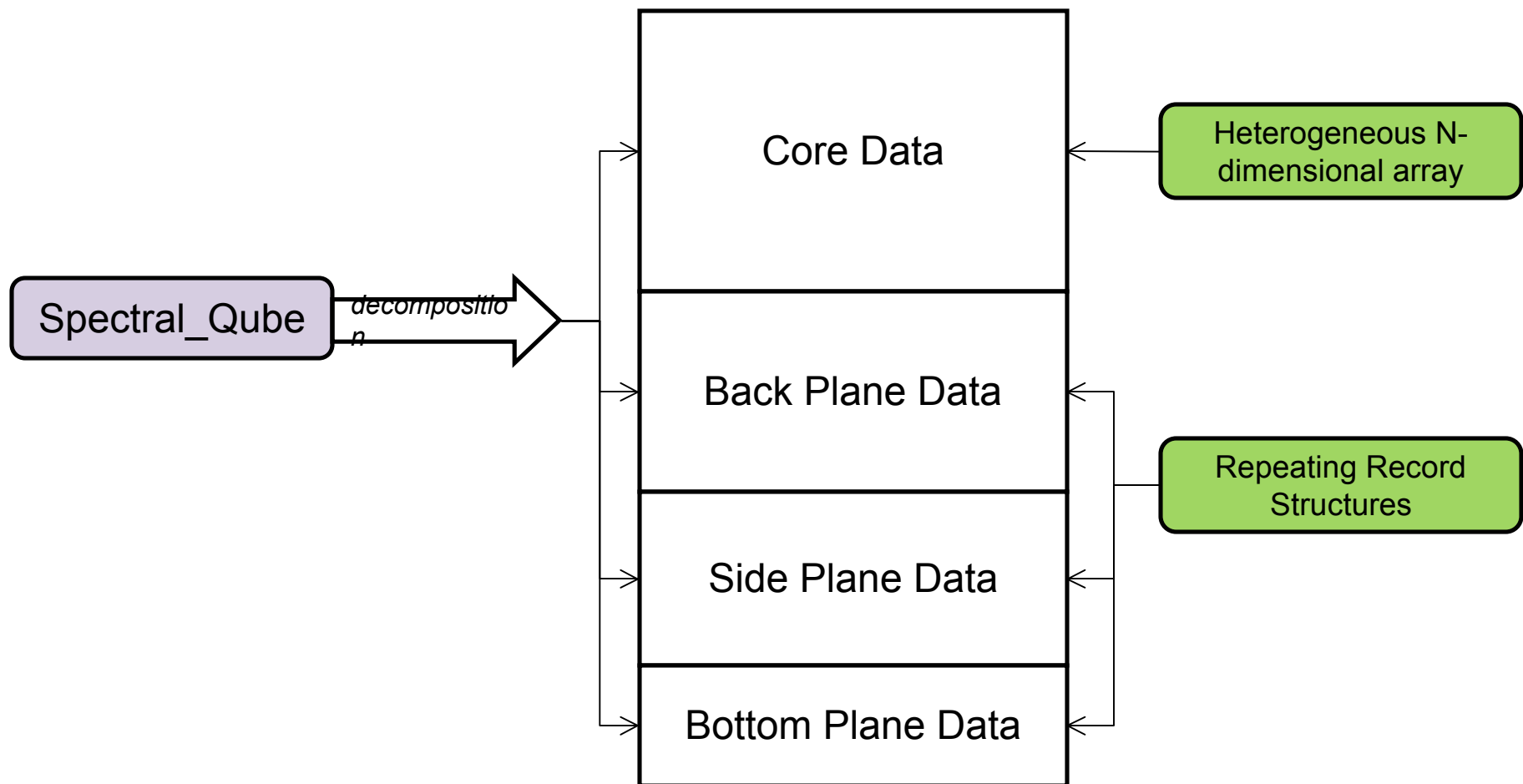| 0,0	0,1	0,2	0,3	…
1,0	1,1	1,2	1,3	
2,0	2,1	2,2	2,3	
…				

- The attributes and methods of the object class endow the storage structure and its values with meaning to the user.

- In this case, the 2-D Image object class defines the lower left corner as the location of the (0,0) pixel; the first axis of the structure as "line"; the second axis as "sample"; and the element value as a greyscale intensity.
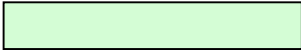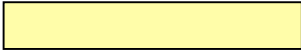
# Decomposing Interleaved Structures

Disk File

Core Data

Heterogeneous N-dimensional array

Spectral_Qube

decomposition

Back Plane Data

Repeating Record Structures

Side Plane Data

Bottom Plane Data

Design New Structures - A 'Minimalist Approach':

- Four simple "**Base Structures**"
  - Designed independent of interpretation.

- PDS supported "**Abstract Classes**"
  - Anything beyond being able to read the bytes from the file and storing in the computer.

- PDS supported "**User Classes**"
  - What users use.
  - Scientist perspective – (false color image)

- PDS Designed Utilities.
  - Conversions involve byte ordering, not alteration of the actual data.
  - Convert between Base Structures and Abstract Interpretations.
  - Convert to PDS supported set of User Interpretations.

Boldly Going Somewhere

PDS 4

PDS 3

Start Fresh
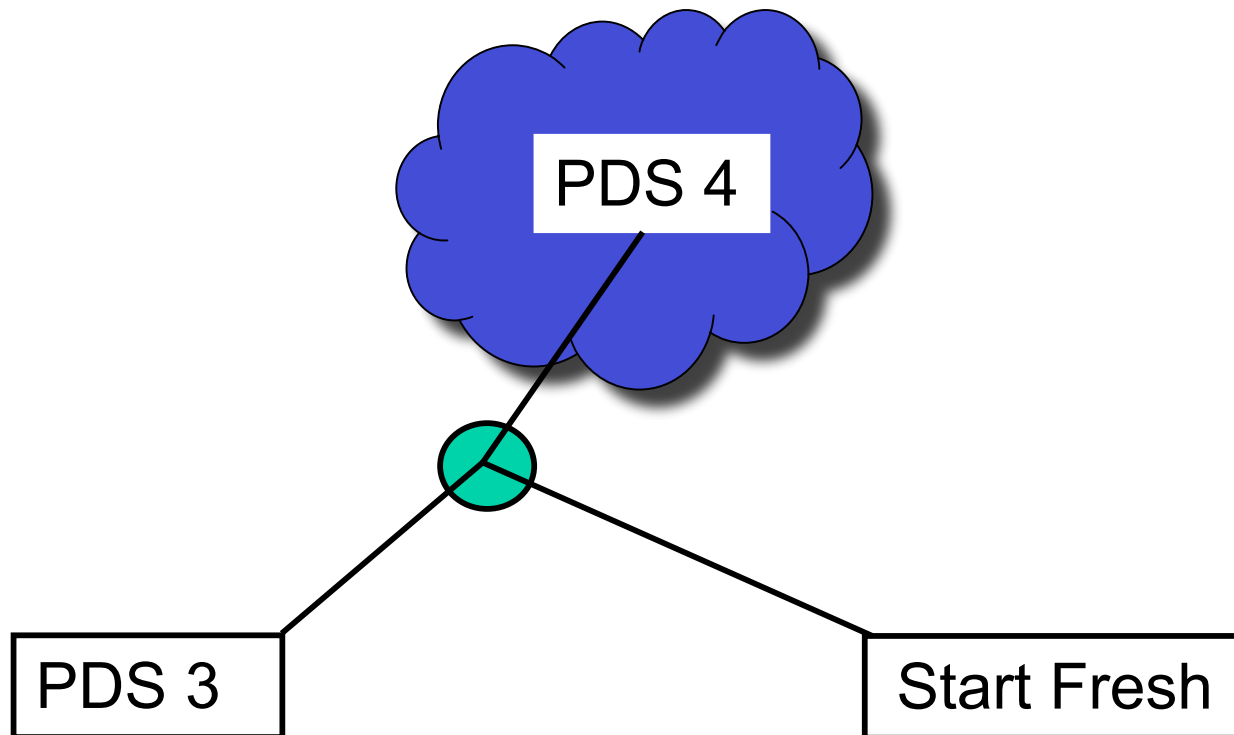
– First we need answers and priorities for the big questions

– Need complete assessment of costs & benefits for a couple of options (How far left or right does the green circle shift?)