

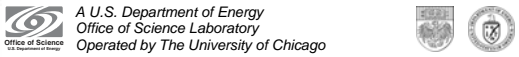
Getting Started with EPICS Lecture Series

Database Design with VisualDCT

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Argonne National Laboratory

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Database Design with VDCT

- **Outline**
 - Introduction to VDCT
 - Using VDCT
 - Converting database files to VDCT
 - New features/options
 - Some VDCT examples
 - Known problems with VDCT
 - Resources
 - Acknowledgements

What is VDCT?

- VDCT is Visual Database Configuration Tool
- Beta version released summer of 2002, funded by SLS
- Developed by *Cosylab Ltd.*
- Replacement for text editor, DCT, JDCT, GDCT or Capfast
- VDCT developed to provide missing features in Capfast(?) and GDCT.
- Supports hierarchical design
- Written in Java
 - Therefore supported in various systems
 - Java Runtime Environment 2
- Importing existing DB and DBD files

What is VDCT?

- **VDCT features**
 - GUI features
 - *Clipboard, undo, redo, object inspector, visual linking*
 - *Data flow arrows, not process flow*
 - Supports hierarchal design
 - *Based on the pvname separator*
 - *Grouping "grp1:grp2:test1AO"*
 - *VDCT templates can be used.*
 - *Separate VDB file as a template with ports and macros defined.*

What is VDCT?

- **VDCT features**
 - Powerful DB parser
 - Supports existing DB's
 - Preserves DB comments, record/field order
 - # normal comments
 - #! VDCT layout comments
 - DB's can be edited manually
 - Single file which contains both DB and display data
 - GDCT created two separate files

What is VDCT?

- **VDCT features**
 - Rapid database development
 - Simple mouse-clicks
 - Visualization of record instances
 - Easier to understand
 - Yet no field description as with DCT, JDCT & GDCT
 - Detect errors faster
 - e.g. broken links shown with a cross
 - Database can be split into logical blocks (grouping)
 - e.g. hierarchical design
 - Printing ?

Using VisualDCT

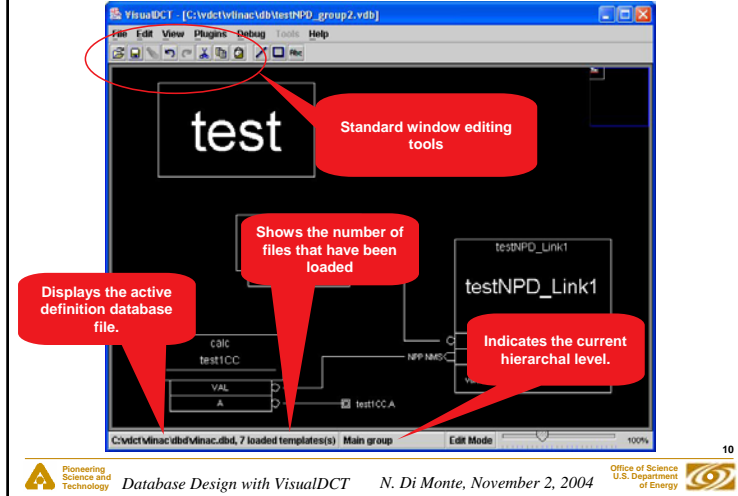
Using VisualDCT

- **Launch VisualDCT by executing jar file**
 - Only file provided in the zip file
 - Current version is build 1249, installed on solaris.
 - Problem with build 1250
 - Currently testing build 1253, used in this presentation.
- **On solaris just type vdct**
 - This script defines the Class Path and then runs the latest version, at this time build 1249 will be executed.

Using VisualDCT

- **To start VisualDCT in Windows**
 - Execute (double click) "VisualDCT2.4.1253.jar"
 - Or, use command line options
 - `VisualDCT2.4.1253.jar [<DBDs>] [<DB>]`
- **Load DBD file(s)**
 - Recommend selecting save option in "DBD Manager"
- **Load DB or VDB file.**
- **Save work with a VDB extension. (recommended)**
- **Once a VDB file is created and saved, no need to specify DBD files, DBD files will be included at the beginning of a VDB file.**
 - `#! DBDSTART`
 - `#! DBD("../dbd/vlinac.dbd")`
 -
 - `#! DBD("other DBD file")`
 - `#! DBDEND`

Using VisualDCT





Standard window editing tools

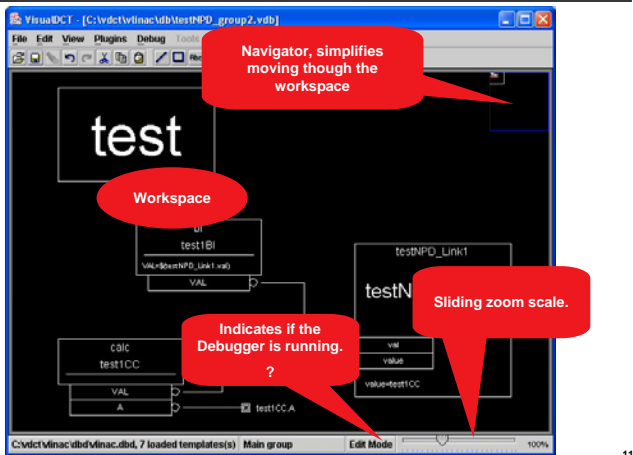
Shows the number of files that have been loaded

Displays the active definition database file.

Indicates the current hierarchal level.


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Using VisualDCT





Navigator, simplifies moving through the workspace

Workspace

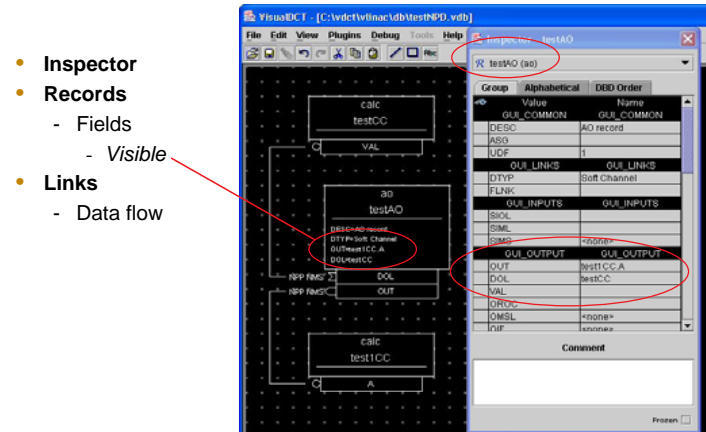
Indicates if the Debugger is running.



Sliding zoom scale.


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Using VisualDCT

- **Inspector**
- **Records**
 - Fields
 - Visible
- **Links**
 - Data flow




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Using VisualDCT

Default is determined by Settings dialog box

Single click to make Visible

Double click to make Invisible

Field Visibility Values

- 0: NON_DEFAULT_VISIBLE
 - Blank for build 1249
- 0: VISIBILITY_SELECT
 - Blank for build 1250
- 1: ALWAYS_VISIBLE
 - Eye
- 2: NEVER_VISIBLE
 - Eye w/Red X

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Using VisualDCT

Visibility text in vdb file

```
#! Visibility("testAO.DTYP",1)
#! Visibility("testAO.OUT",2)
#! Visibility("testAO.DOL",2)
```

Visibility Defined:

```
#! Visibility("fieldname", visibility)
```

Where visibility:

- 0 – NON_DEFAULT_VISIBLE
 - Build 1249 and earlier.
- 0 – VISIBILITY_SELECT
 - Build 1250 and later.
- 1 – ALWAYS_VISIBLE
- 2 – NEVER_VISIBLE

Using VisualDCT

Visibility text in vdb file

Why Option #0 should be NON_DEFAULT_VISIBLE for build 1249

- The visual graphics should convey the logic of the design.
- When importing an old text database, almost all fields have been defined with at least the default value.
- The designer should highlight the fields of interest to clarify the logic flow.
- Limited work space in the graphical window.

Build 1250 added an option to change this:

- Defined in: View => Settings => Visual TAB
- Uncheck "Show value of fields when it is not default"
 - All fields are now hidden except for those fields set to visible

Using VisualDCT (links)

Link that connects to a pv in grp1.

Link with two connectors used to reposition link.

Link with an invisible section between two connectors

Ext Output

Ext Input

Port

For template

Macro

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Using VisualDCT (links)

Link/Connector text in vdb file

```
#! Field("testAO.OUT",255,1,"testAO.OUT")
#! Link("testAO.OUT","testAO/OUT2")
#! Connector("testAO/OUT2","testAO/OUT1",660,340,255,"",0)
#! Connector("testAO/OUT1","testAO/OUT",620,380,255,"",1)
#! Connector("testAO/OUT","test1CC.A",220,480,255,"",0)
```

Using VisualDCT (links)

Link/Connector text in vdb file

#! Field("fieldname", color, rotated, "description")

Where rotated: (*not documented*)

- 0 – Left side of field box
- 1 – Right side of field box

#! Link("fieldname", "inLinkID")

#! Connector(" inLinkID ", " outLinkID ", x, y, color, "desc", option)

Where option: (*not documented*)

- 0 – Visible
- 1 – Invisible
- 2 – External Input
- 3 – External Output

Using VisualDCT

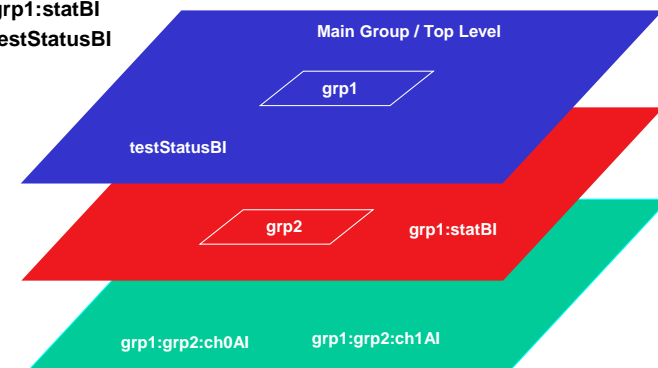
Hierarchy Support

- Based on the pvname separator
- Grouping "grp1:grp2:test1AO"
 - This will create three levels
- Grouping must be enabled before loading DB
 - Separator must also be defined
- Support templates
 - Use *Generate...* command to flatten vdb with templates
 - *Macros* pass information into a template
 - *Ports* pass information upwards out of a template
 - Use import command to add template

Using VisualDCT

Hierarchy

- grp1:grp2:ch0AI, grp1:grp2:ch1AI
- grp1:statBI
- testStatusBI

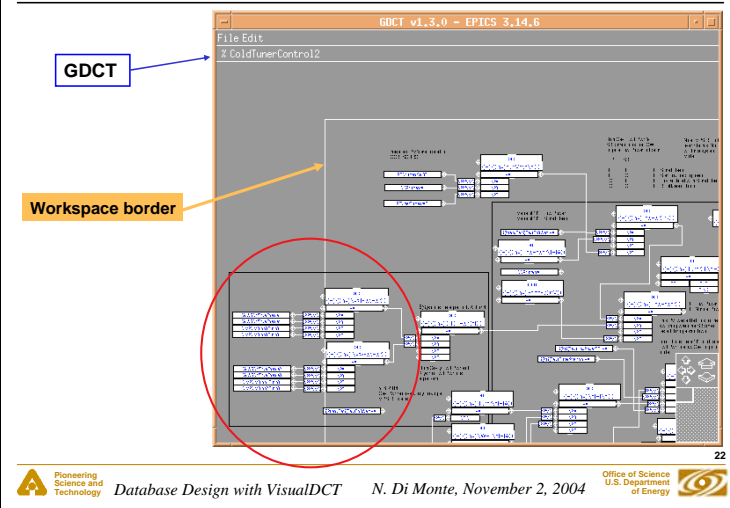


Converting files

- **Converting from GDCT313 to VisualDCT**
 - From the File menu, select "Save As VDCT..."
 - Minor touch up maybe needed.
 - All graphic items **must** be in the defined workspace outlined by the white border in GDCT

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Converting files



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Converting files

- **Converting a DB text file to VisualDCT**
 - In VisualDCT select View menu, then Settings
 - Then select *Visual Tab*
 - Uncheck "Show value of fields when it is not default"
 - Load DB file
 - Rearrange display for clarity
 - Save with a .vdb extension (recommended)
 - The Generate command will only create a .db file

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Converting files

Tools not to use on VDB files, JDCT & DCT313

- They remove all display formats

Caution when using "vi" or text editor

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New command/options

New features in Build #1253

- **Morph command**
 - Allows a record to be converted from AI to AO, etc.
- **Speed option**
 - Silhouette when moving a record
- **Field Visibility**
 - Option to change the default visibility
- **Window Pan Direction**
 - Push or pull while moving around workspace.

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VisualDCT examples

- **Virtual LINAC**
 - Database in original text form
 - DB imported to VDCT
 - DB modified for appearance, logical flow
 - Color links
 - Invisible links
 - Text boxes

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VisualDCT examples

- **Database conversion, with build #1253**
 - Start VDCT, load DBD file
 - Grouping turned off
 - Set "Field Visibility"
 - Load a text only DB (rfD1_Vx2.db)
 - Clear "Field Visibility"
 - Load a modified DB (rfD1_Vx2.vdb)

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VisualDCT examples

- **Editing commands, with build #1253**
 - Load a modified DB (rfD1_Vx2.vdb)
 - Edit commands.....
 - Moving around workspace, (Ctl-arrow)
 - Navigator window
 - Zoom slider
 - Keyboard (Shift-[left/right]arrow)
 - Selected zoom, (Shift-space)
 - Inspector
 - DBD manager
 - Saving
 - Invalid DBD

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VisualDCT examples

- **Creating a new database**
 - Start VDCT, load a DBD file
 - Create records
 - Add links, using mouse
 - Use inspector on records, define CALC field
 - Add "connector" on a link
 - *Show invisibility option*
 - Add an external input and output links
 - Demonstrate morph feature

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VisualDCT examples

- **Hierarchy, grouping function, with build #1253**
 - Restart VDCT with grouping enabled
 - Load a modified DB (rfD1_Vx2.vdb)
 - *Why this is annoying*
 - Designed to be small flat DB
 - Most records create their own group in this example
 - Accessing the different group levels
 - *Double clicking on object will descend into group*
 - *Shift-Up will ascend one level at a time*
 - Status bar indicates the current level in the design

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VisualDCT examples

- **Hierarchy, cont.**
 - Load testNPD_group2.vdb
 - With grouping enabled, create a pv with several Grouping separators, we will use " : ", as in `grp1:gpr2:gpr3:ch0AI`
 - Descend into group test
 - Descend into template testNPD_Link1
- **Groups are maintained in a single file**
- **Template is maintained in an external file**

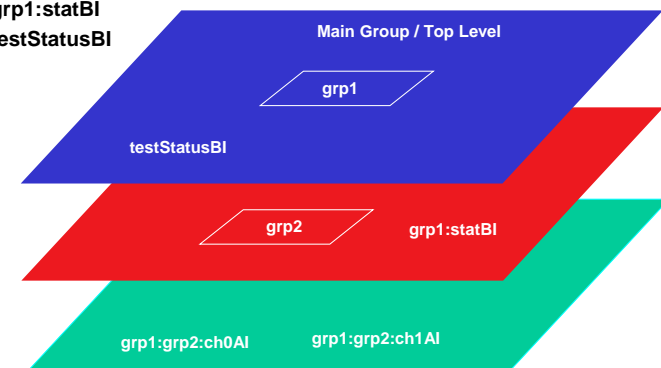
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VisualDCT examples

Hierarchy

- `grp1:grp2:ch0AI, grp1:grp2:ch1AI`
- `grp1:statBI`
- `testStatusBI`



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VisualDCT examples

- **Templates, brief overview**

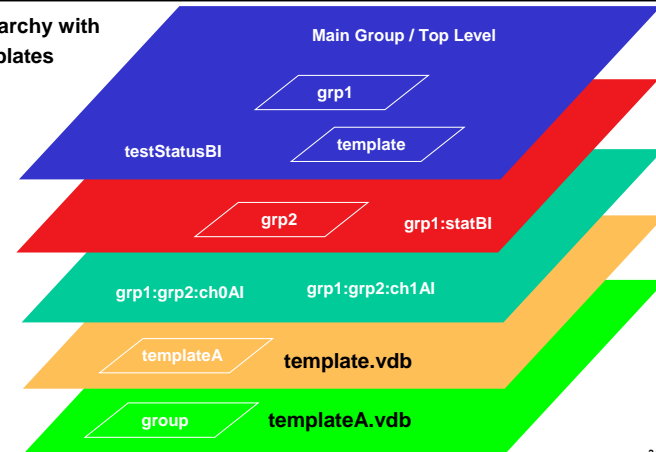
- Restart VDCT
- Import testNPD_Link1.vdb
 - Or load testNPD_Link1.vdb first.
 - *Every DB load is considered a template.*
 - Not all templates have access ports
- Place a template object on the workspace
- Save database
- Descend into template
- Discuss template properties
- The "Generate..." command
 - *Combines multiple template files with the main file and generates a single DB file.*
- Template can have templates
 - *Example in hierarchy/dbs/test.vdb, grouping enabled*

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VisualDCT examples

Hierarchy with templates



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VisualDCT examples

Hierarchy, cont.

Pros & cons

- **Groups are maintained in a single file**
- **Template is maintained in an external file**
- **Groups have no ports/macros to connect visual links**
- **Templates can define as many as needed for visual links**
- **Groups can define templates**
- **Templates can define groups**

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VisualDCT examples

Hierarchy, cont.

Design consideration

- **Is the design large enough to use grouping?**
 - Is the pvname creating single pv groups?
 - *Text editor is just as useful then.*
 - Visual links jumping to other group levels should be kept to a minimum.
- **Can the design be broken up into smaller files (templates)**
 - Main file is then dependent on other files.
 - A port definition will only use the first instance of a template, all ports in subsequent repeated templates will be ignored. That is, all of these same templates will have the same port connected to the same link.

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Known problems/concerns

- **Printing ?**
 - What you see is what you get
- **Field visibility**
 - Problem in build 1249 and earlier
 - Option in 1250 and later
- **Grouping option**
 - This should be set in the vdb file
 - Design preference, flat or hierarchy
- **Field box and visible links changed in build #1253**
 - DBs created with 1249 or earlier

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Resources

- **Cosylab VisualDCT Project Info**
 - Provides related articles and presentations, links to Builds, demo, bug reports, etc.
 - http://control.cosylab.com/customer_area.php?mid=6&sid=26&ssid=2
- **VisualDCT download page**
 - Download the latest builds, documentation, examples and plugins
 - <http://www.cosylab.com/visualdct/builds/VisualDCT/>
 - *Build #1250 not recommended for download.*

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- **Matej Sekoranja is the primary developer of VisualDCT. He has implemented several changes that I have asked for to help import old DB files and has implemented other requested features. He has been a great help.**
- **Ken Evan modified GDCT to provide an option in GDCT to convert a GDCT file to a VDCT file format.**

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Visual DCT

Thank you for your time.
Nick Di Monte

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