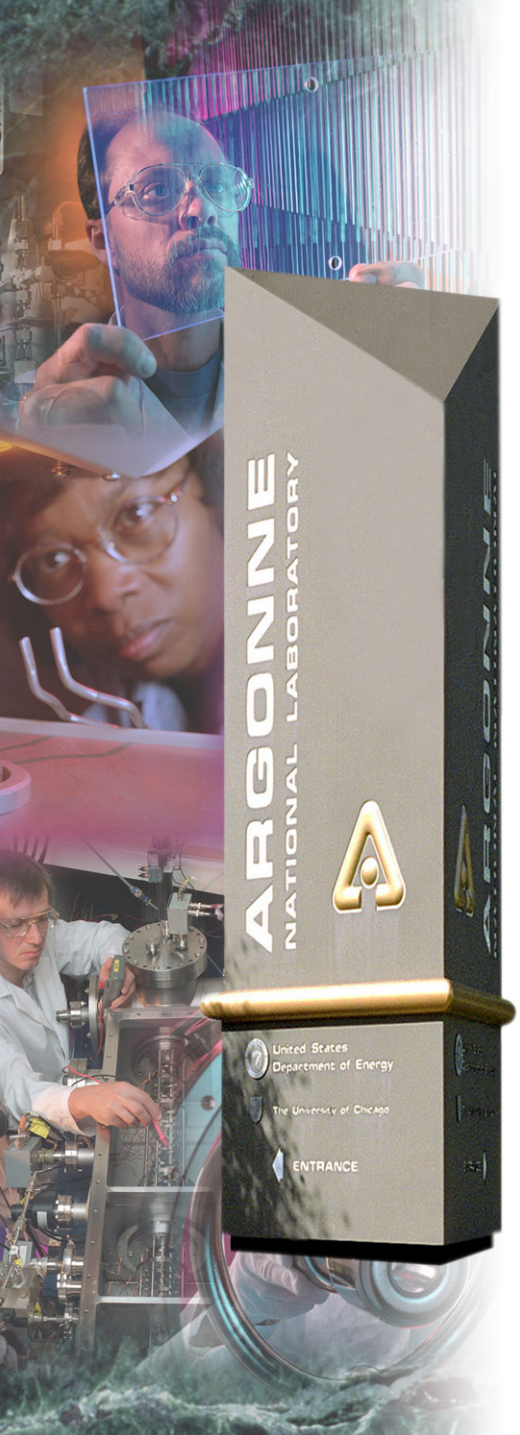

Getting Started with EPICS Lecture Series

Database Design with VisualDCT

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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

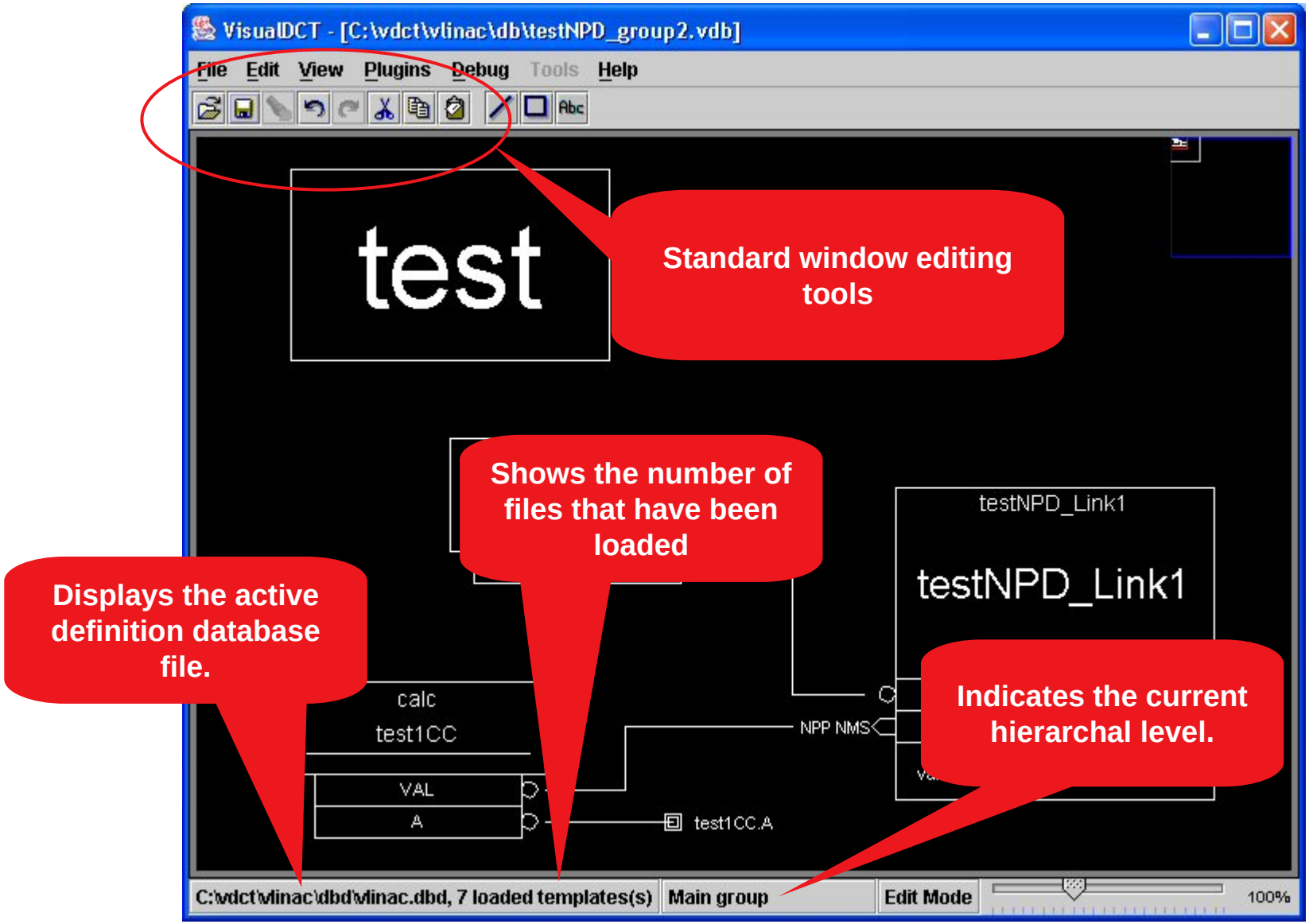
Using VisualDCT

- **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.

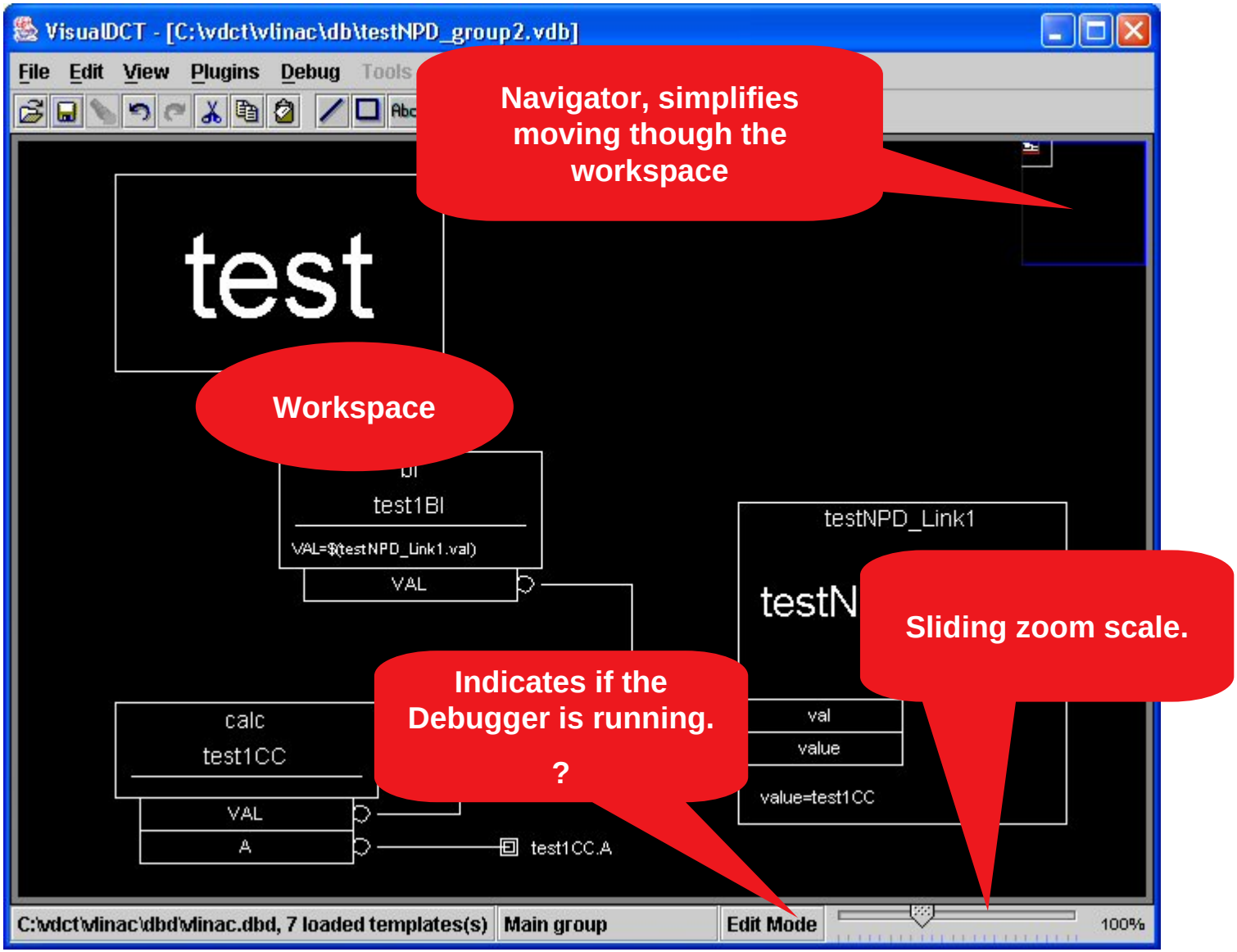
Using VisualDCT

- **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

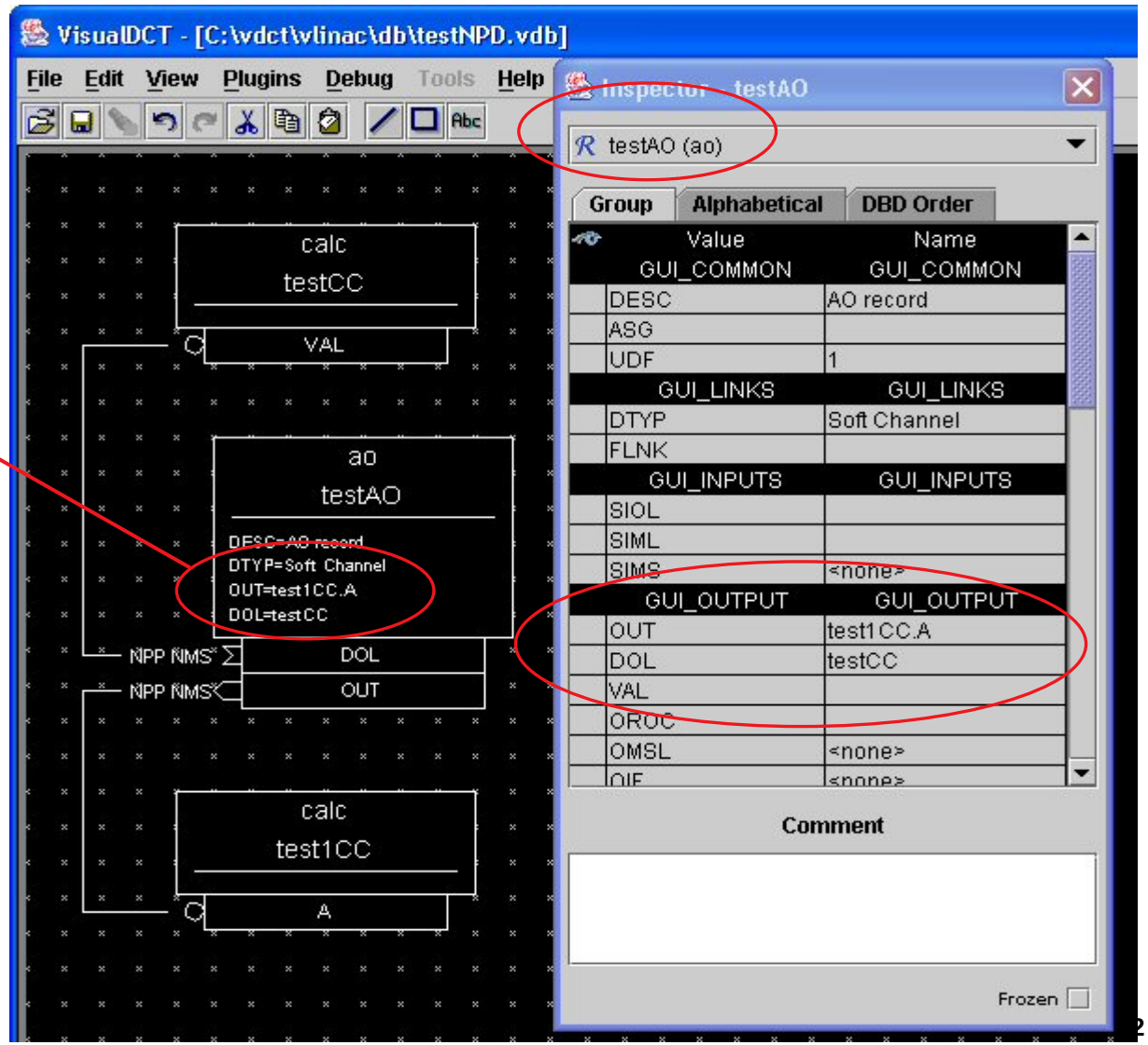


Using VisualDCT



Using VisualDCT

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



Using VisualDCT

Field Visibility Values

-0: NON_DEFAULT_VISIBLE

-Blank for build 1249

-0: VISIBILITY_SELECT

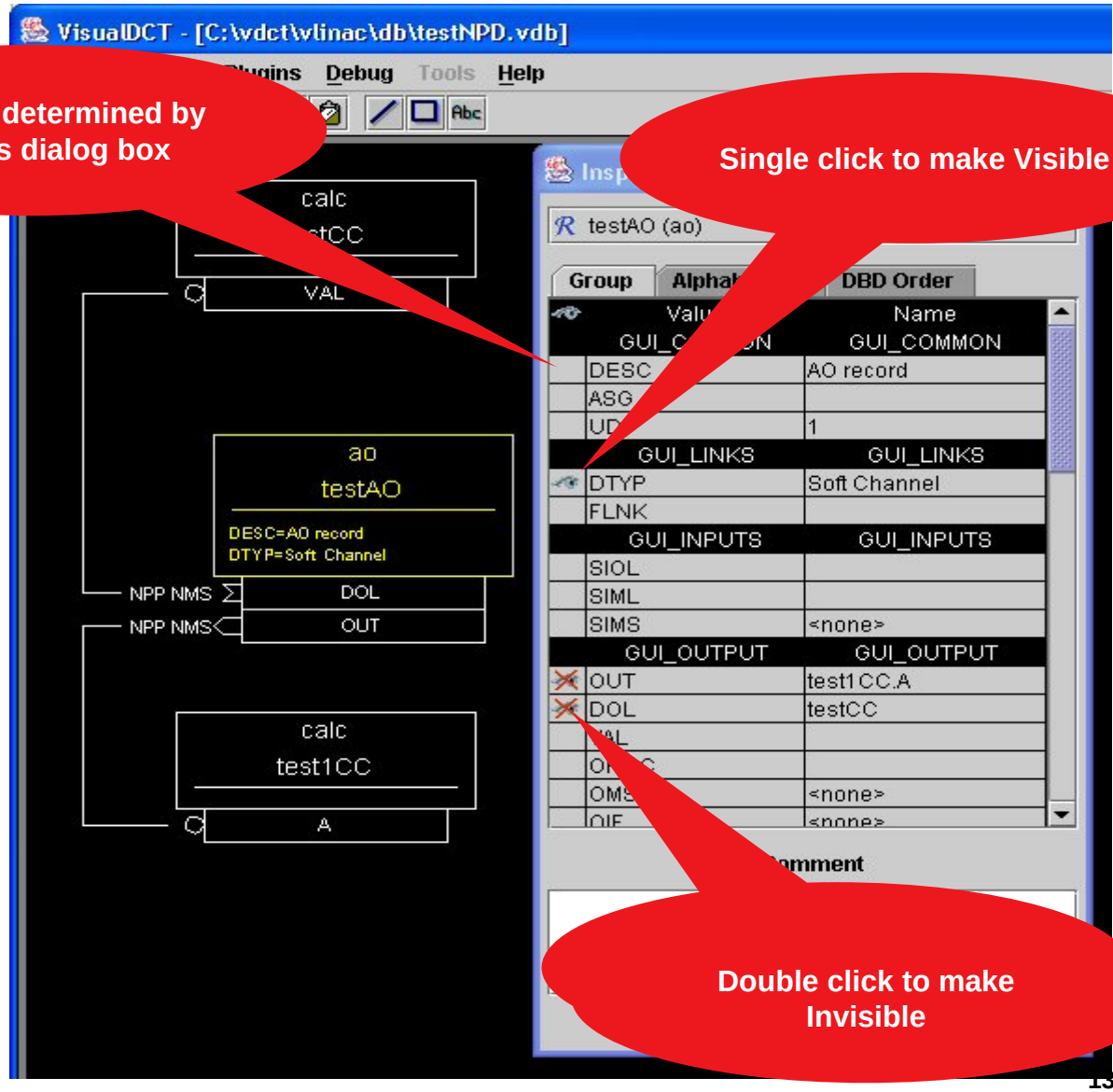
-Blank for build 1250

-1: ALWAYS_VISIBLE

-Eye

-2: NEVER_VISIBLE

-Eye w/Red X



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

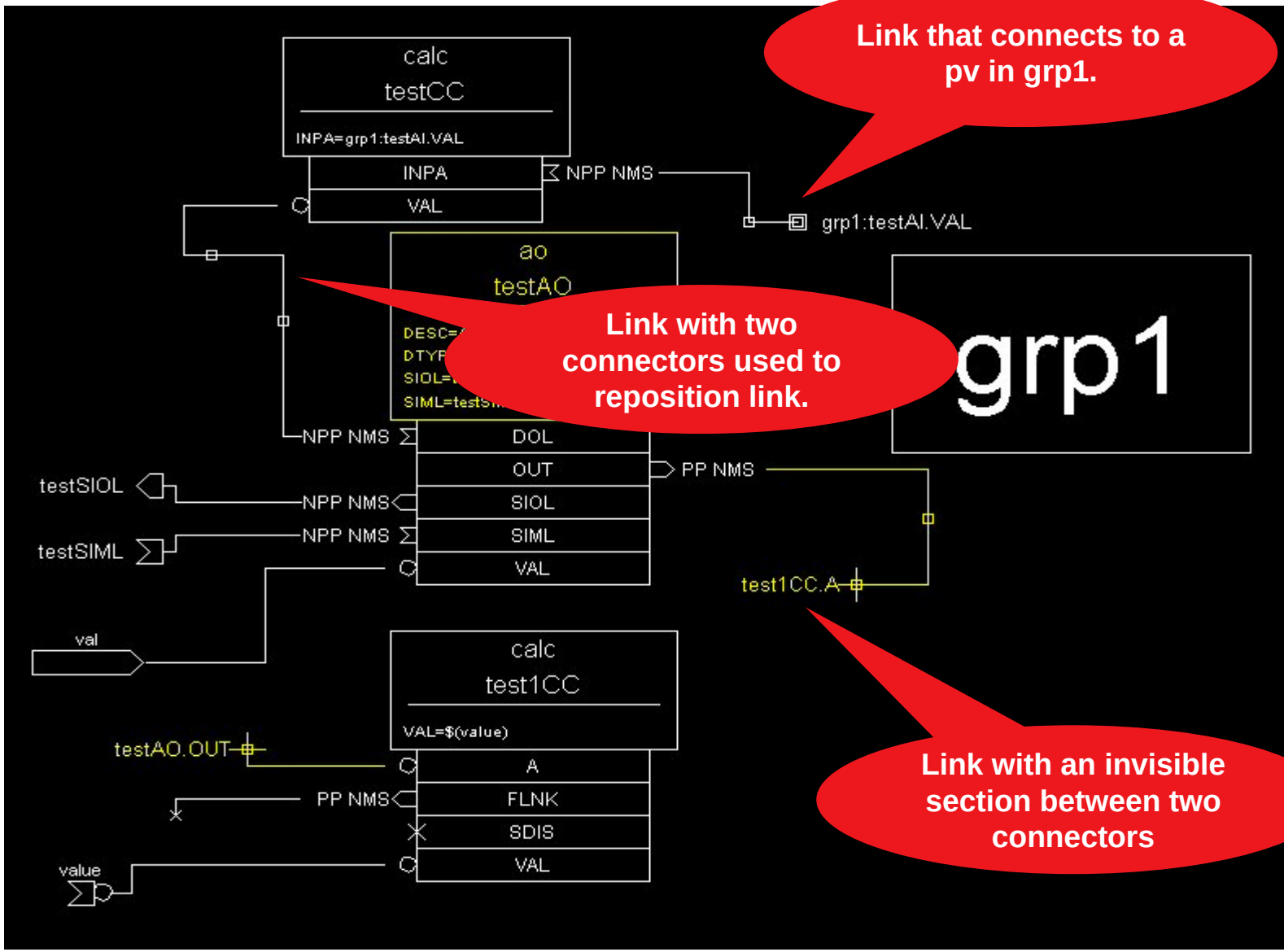
Why Option #0 should be NON_DEFAULT_INVISIBLE for build 1249

- 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)



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

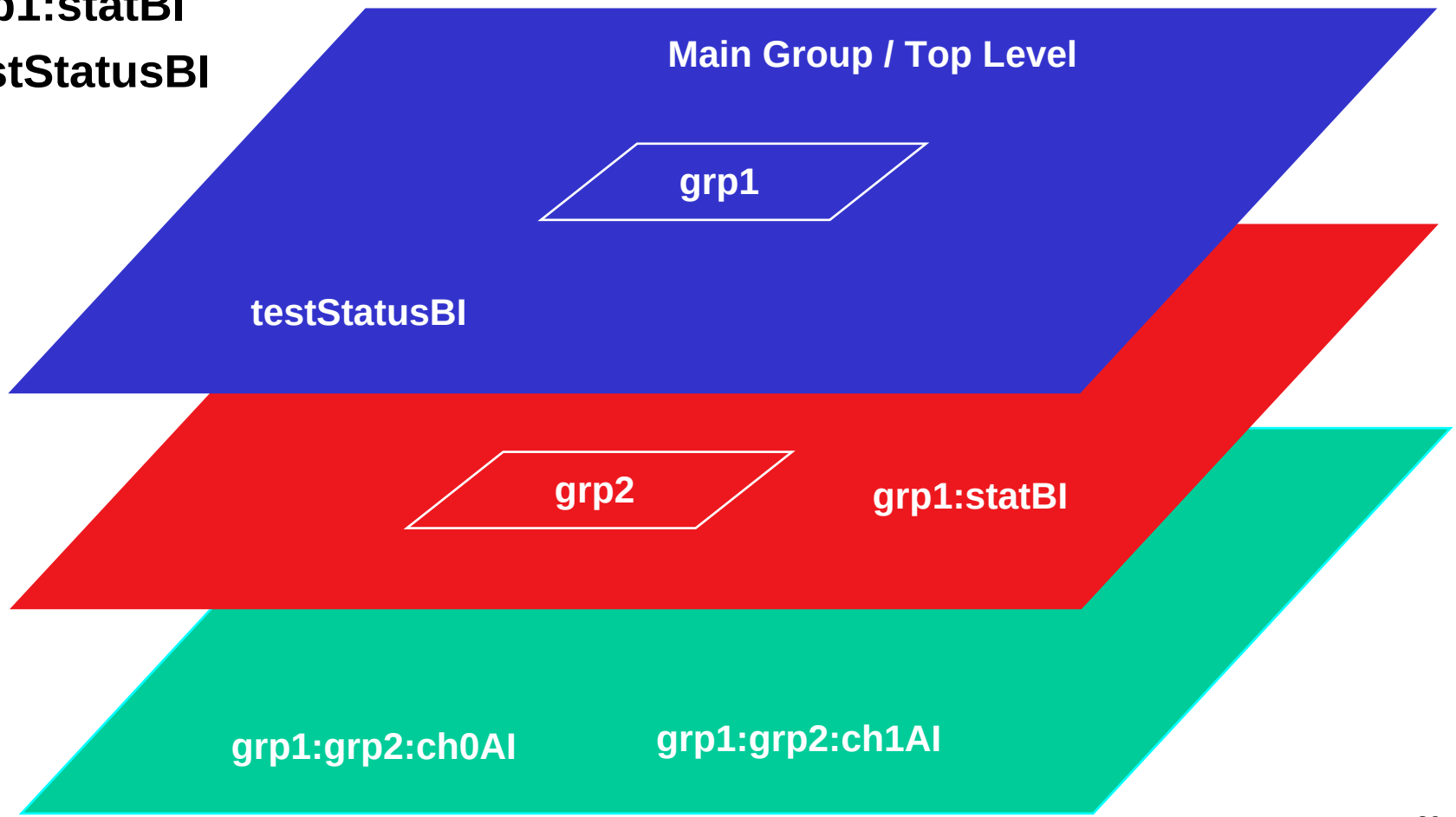
Hierarchy Support

- **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

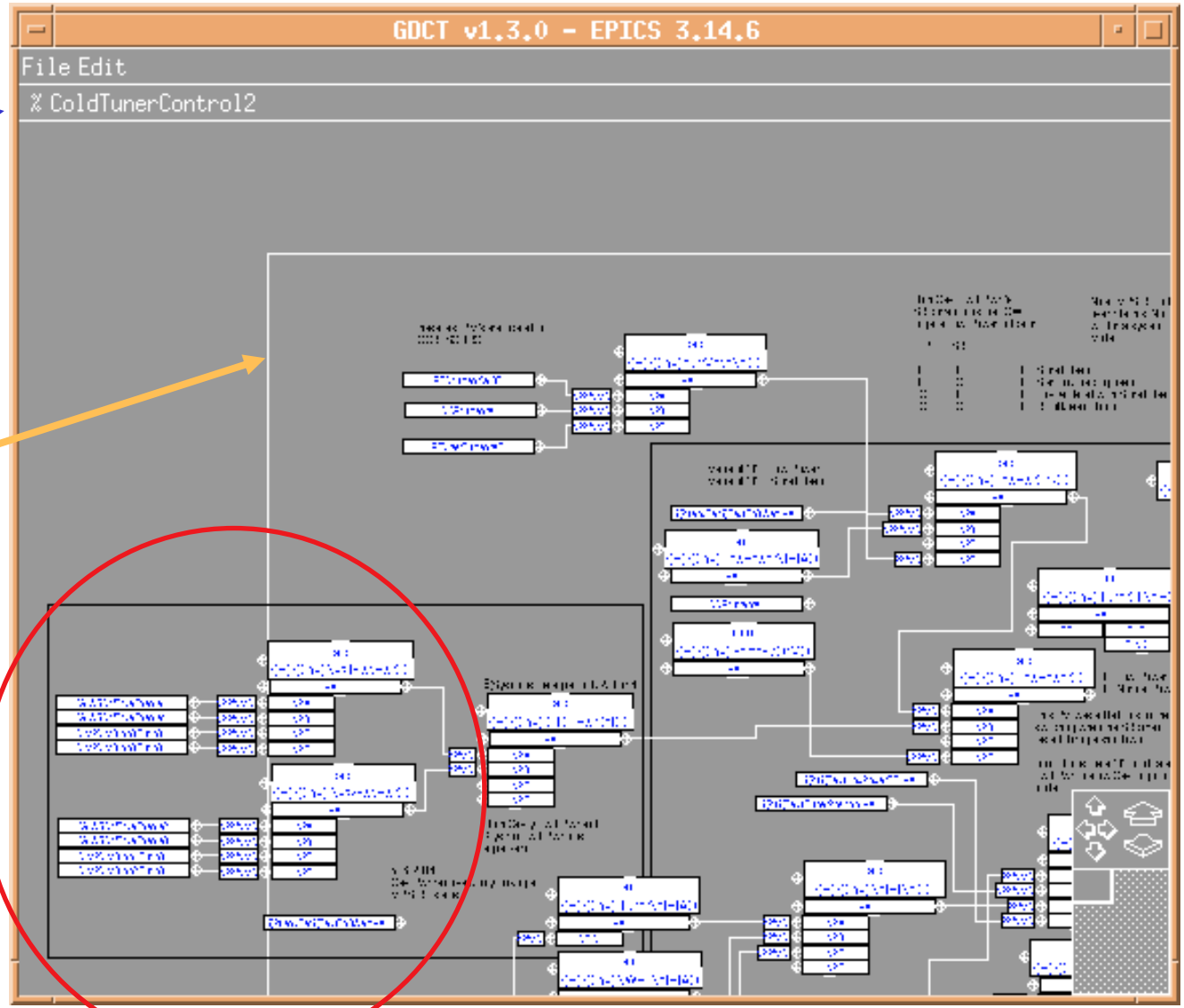
- grp1:grp2:ch0AI, grp1:grp2:ch1AI
- grp1:statBI
- testStatusBI



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

Converting files



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*

Converting files

Tools not to use on VDB files, JDCT & DCT313

- **They remove all display formats**

Caution when using “vi” or text editor

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.

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*

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)

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*

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

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

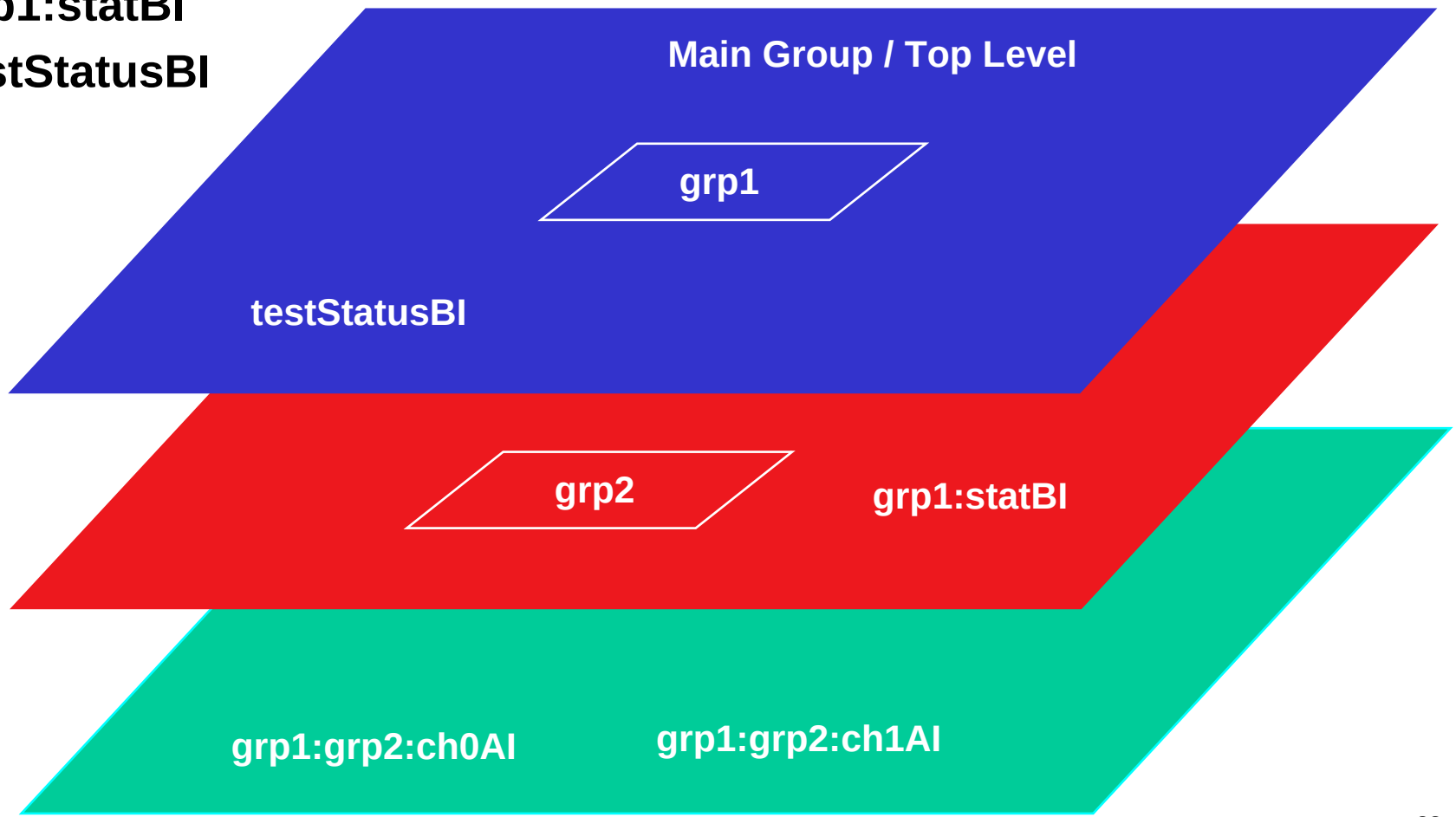
VisualDCT examples

- **Hierarchy, cont.**
  - Load testNPD_group2.vdb
  - With grouping enabled, create a pv with several Grouping separators, we will use “ **:** ”, as in gpr1: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**

VisualDCT examples

Hierarchy

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

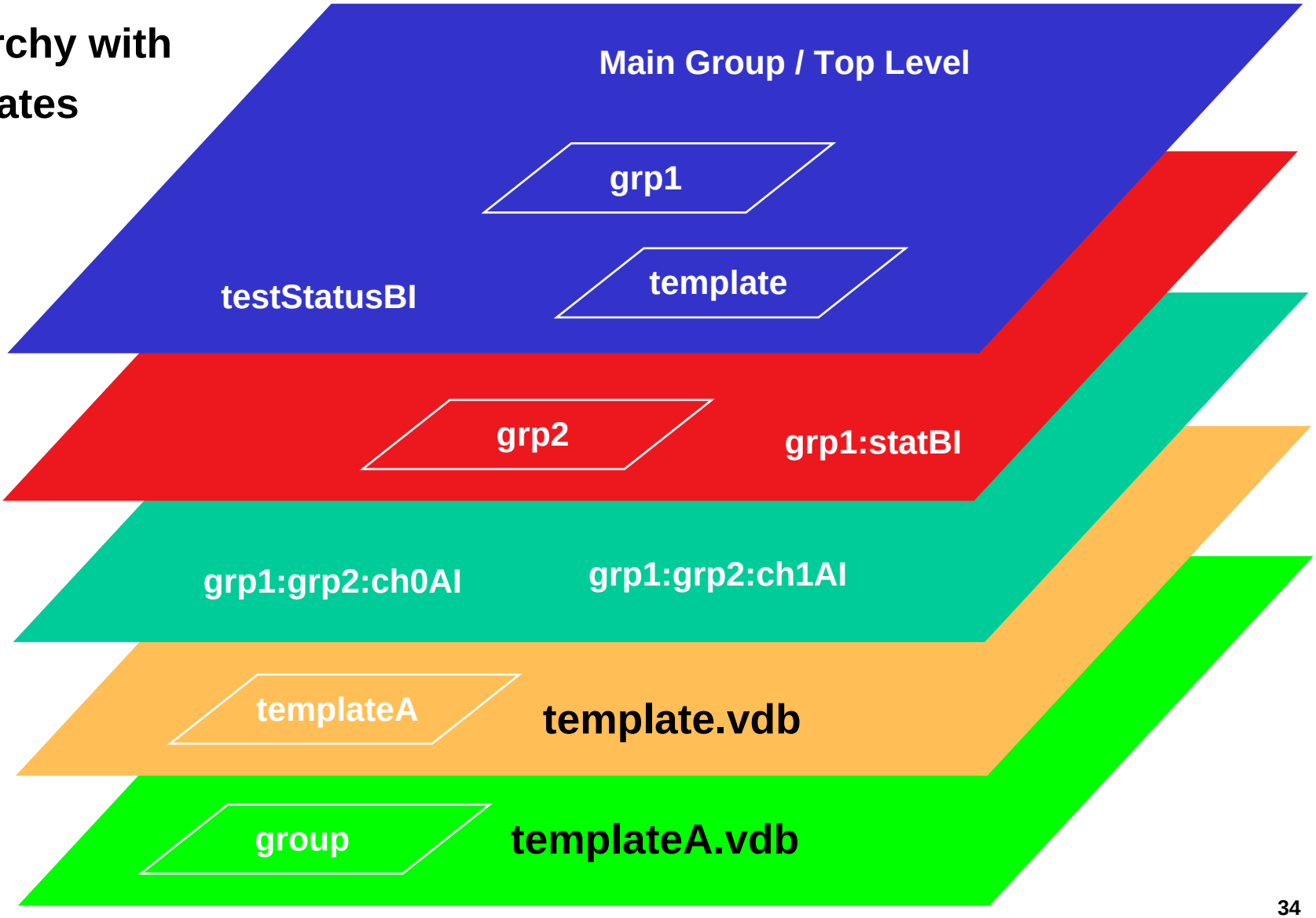


VisualDCT examples

- **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…” comand
    - *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*

VisualDCT examples

Hierarchy with templates



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**

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.

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

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.*

Acknowledgements

- **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.**

Visual DCT

Thank you for your time.

Nick Di Monte