



Welcome to the Virtual IMS user group newsletter. The Virtual IMS user group at [www.fundi.com/virtualims](http://www.fundi.com/virtualims) is an independently-operated vendor-neutral site run by and for the IMS user community.

## Virtual IMS user group presentation

The latest webinar from the Virtual IMS user group was entitled, "IMS User Exits for Data Tailoring". It was presented by James Wilson, Software Developer at BMC Software.

James has been a software developer at BMC Software in the IMS area for 6<sup>1</sup>/<sub>2</sub> years. He has a MS in Computer Science from Northern Illinois University. James eats, sleeps, and breathes Assembler coding, and so he's found a passion for user exits, specifically in IMS.

James started his presentation by introducing us to user exits. He said they were small programs written by the user and 'plugged in' to IMS. They provide extreme customizability, but

In general, right-to-left



Figure 1: Assembler primer

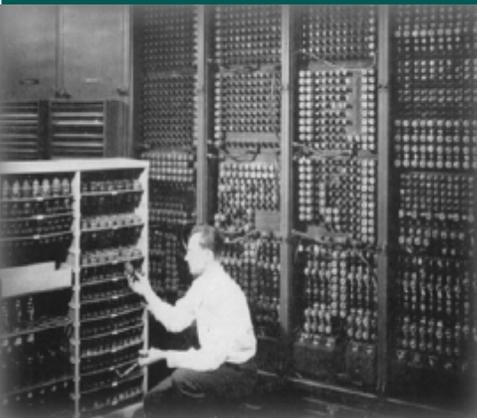
at the expense of manual coding (often Assembler). One huge benefit is the compatibility between versions making them very low maintenance once written. But it can be easy to forget about them!

James then covered some Assembler basics. CSECT is the program and its constants 'literals' (read only). DSECT is the layout for an area of storage. D(B) address is the 'Base-

displacement' memory addresses. A 'base' register and fixed value (0-4095)

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## -Follow familiar patterns... Example:

```

IF (X > Y) THEN          CLC   X,Y          WHILE (ENTRY NOT= X) DO      LA   R1, TABLE
    X := Y                JNH   LABEL100        ENTRY = NEXTENTRY        LOOP100 DS  0H
ENDIF                    MVC   X,Y          ENDWHILE                CLC   X, 0 (R1)
                        LABEL100 DS  0H    JE   LOOP200
                                                LA   R1, 4 (R1)
                                                J    LOOP100
LOOP200 DS  0H
    
```

## -COULD does not mean SHOULD. Example:



```

XC   FIELD1, FIELD2      MVC   TEMP, FIELD1      ST   R1, TEMP
XC   FIELD2, FIELD1      MVC   FIELD1, FIELD2    LR   R1, R2
XC   FIELD1, FIELD2      MVC   FIELD2, TEMP      L   R2, TEMP
    
```

**Figure 2: Golden rules of Assembler coding**

to add. He gave some examples: 0(R1), 50(R2), 4095(R15), and then warned the user group that if they see a lot of these, they're coding wrongly (should be using DSECTs). USING is a statement to 'map' a DSECT/ CSECT to 'base register'. Note: the 4095 limit means a single base register only addresses 4096 bytes.

Figure 1 shows the order that instructions are written. Common instruction types include:

- RR instruction – register and register LR R1,R5
- RX instruction – register and address L R1,0(R5)
- SS instructions – Address(length) and address MVC 0(26,R1),0(R5)

- SI instructions –address and immediate value (immediate values are part of the instruction itself, no need to address)MVI 0(R1),C'X'

Amode/Rmode – attributes of resulting load module:

- Amode indicates what addressing mode the program expects to be called in (assume 31 for exits)
- Rmode indicates whether the load module requires to be loaded “below the line” (accessible by amode24)

Condition code values are set by MANY instructions, most notably 'compare' instructions. The values are 'equal', 'low', 'high', and 'overflow'.

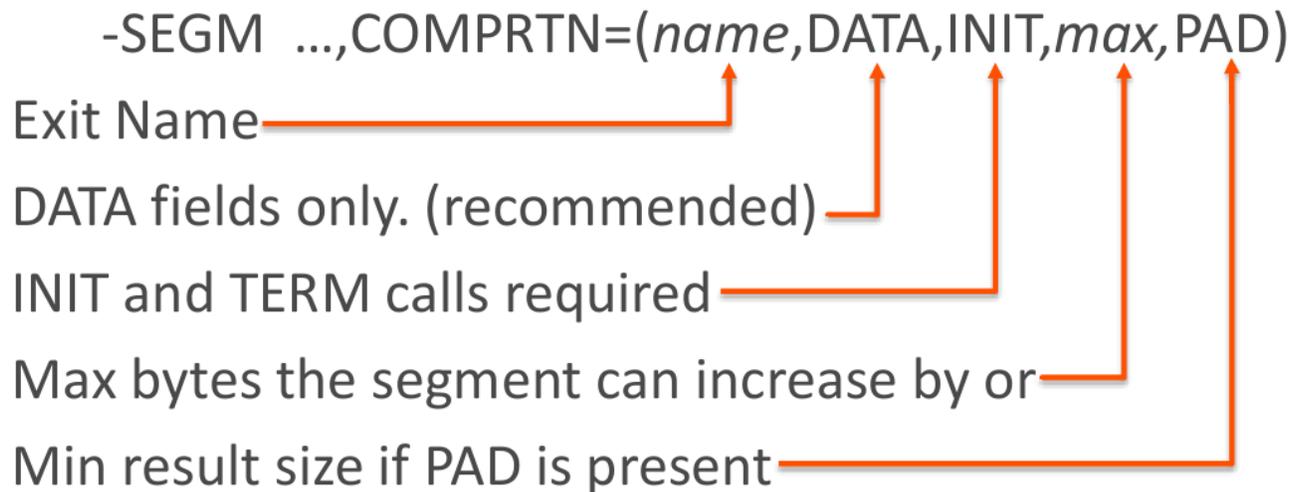
Branch / Jump are based on condition code, gosomewhere else. Jump is like 'Branch Relative', just like a branch, but no addressability needed. Figure 2 shows some more golden rules.

Exits always have usage (what is it for?); communication scheme (environment and information supplied to it, and values expected from it); restrictions (what is allowed and forbidden, and required attributes – Amode/Rmode/ RENT); and a sample exit (in<hlq>.ADFSSRC or <hlq>.ADFSSMPL).

Segment edit/compression is illustrated in Figure 3. You get encode and decode segments. They're specified in DBD at individual segment level. They're valid for full-

## Technical info

-Specified on COMPRTN= on SEGM in DBD.



**Figure 3: Segment edit/compression**

function and DEDB. You should leave Key field unchanged (but doesn't have to). The benefits are compression (reduced DASD size, smaller and faster logs).

In a REORG segment, you can Keep, Modify, or Delete segments during unload/reload/reorg. Delete deletes a segment and its dependents or a segment and any remaining records. It's specified in USEREXIT(*name*) keyword on utility execution. The benefits are that it's a very fast and efficient way to manipulate segments *en masse*. You can use it to change field size/format, delete obsolete segments, etc. Note: changes are not given to Data Capture Exits.

Exits can be used for secondary index maintenance. This is informally called a 'Sparse' routine. It allows customized suppression of index segments. This is instead or in addition to a NULLVAL parameter. The benefits are that it optimizes applications that process using a secondary index but are interested in only a subset of the full database's segments. It provides more flexibility than the NULLVAL option.

Figure 4 shows a review of secondary indexes. They are called by IMS whenever there's an update (ISRT/DLET/REPL) of the index source segment. The Function is the same regardless of update type.

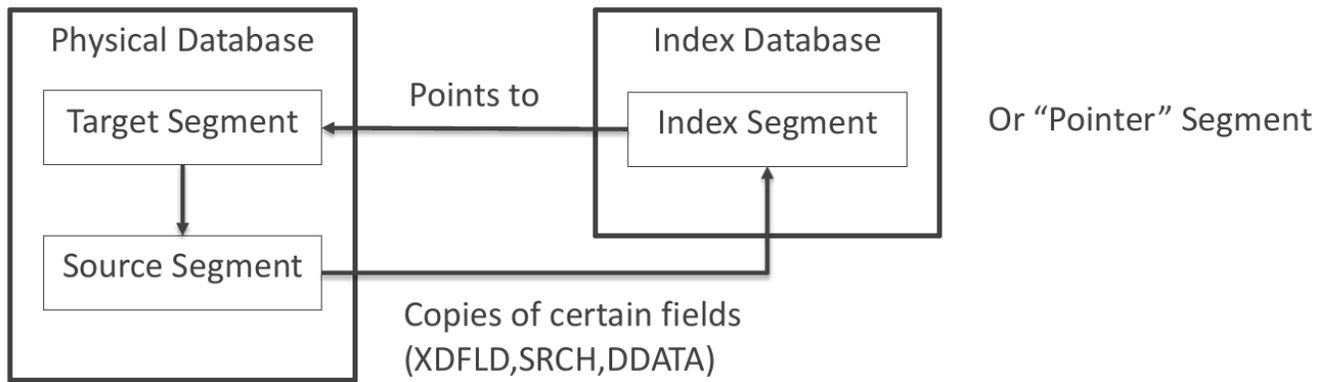
Entry would need the index information (Indexed segment, XDFLD), the source segment, and the index segment (hypothetical). For the Exit, R15 = return code (0=keep, 4=suppress).

Exit partition selection requires:

- Define the partitioning scheme for a HALDB instead of pure high-keys
- Map root key to partition number
- Order partition numbers for sequential processing

The benefit is that it's more flexible than high key schemes.

The Call types for Exit: Partition Selection are:



Often Source=Target

**Figure 4: Secondary index review**

- Init – given single haldbinfo, build persistent areas
- Term – clean up any built areas
- Re-init – haldbinfo changed, re-build anything necessary (often unused)
- Get-First – return first partition number
- Get-next – given part number, return next part num(or end)
- Get-Target – given root key, return partition number.

The last three are the ones that are usually used.

The information passed in the DFSPSEIB macro includes:

- Communication area (DFSPECA dsect), including the

function code, entry parameter(s),return fields

- Overall Partitioning info (DFSPDA dsect), including the number of partitions, longest key string length, and five user fields persistent across calls (PDAUSR1 –PDAUSR5)
- Individual partition info (DFSPDAE dsect), including one copy per defined partition, and partition name, keysting, and number.

As you can guess, the presentation included a lot more information than we have room to discuss here.

A copy of James’s presentation is available for download from the Virtual IMS user group Web site at [www.fundi.com/virtualims/presentations/IMSuserexitsFeb17.pdf](http://www.fundi.com/virtualims/presentations/IMSuserexitsFeb17.pdf).

You can see and hear the whole user group meeting by downloading the WMV file from [www.fundi.com/virtualims/presentations/2017-02-07meeting.wmv](http://www.fundi.com/virtualims/presentations/2017-02-07meeting.wmv).

### Meeting dates

- On 11 April 2017, GT Software’s Dusty Rivers will be presenting.
- The following meeting will be on 6 June 2017, when Fundi Software will be presenting.

### IMS news

Compuware has announced the latest version of Topaz Workbench/File-AID, which provides file and data management to access, edit, compare, move, and

transform data. Topaz Workbench provides a modern, Eclipse-based IDE for File-AID. File-AID for IMS DBD Visualization lets users visualize the structure of physical or logical IMS databases to understand the segments, keys, logical relationships, and other fields defined within the DBD.

### IMS articles

*IMS Solution Adoption Kits help users with application modernization* by Poonam Chitale on Destination z Resource Center (December 2016). You can find the article at <http://destinationz.org/Mainframe-Solution/Resource-Center/A-Modern-Solution>.

### Sponsorship opportunity

Are you missing a great opportunity to advertise your IMS software?

The Virtual IMS user group is now offering software vendors the opportunity to advertise their products in a number of ways. You could have an advert on the home page of the Web site (at

**Like us on  
Facebook**

**#VirtualIMS**

[www.fundi.com/virtualims](http://www.fundi.com/virtualims)), you could advertise in the newsletter, and/or you could advertise in the monthly e-mails sent to members of the user group.

E-mail [trevor@itech-ed.com](mailto:trevor@itech-ed.com) for full information about marketing opportunities with the Virtual IMS user group.

### Arcati Mainframe Yearbook 2017

The brand new Arcati Mainframe Yearbook is available now. It includes an annual user survey, an up-to-date directory of vendors and consultants, a resources guide, a strategy section with papers on mainframe trends and directions, a glossary of terminology, and a mainframe evolution section.

You can access the download page at <http://www.arcati.com/newyearbook17/>. The Yearbook is available in PDF format and is completely FREE.



### About the Virtual IMS user group

The Virtual IMS user group was established as a way for individuals using IBM's IMS hierarchical database and transaction processing systems to exchange information, learn new techniques, and advance their skills with the product

The Web site at [www.fundi.com/virtualims](http://www.fundi.com/virtualims) provides a central point for coordinating periodic meetings (which contain technically-oriented topics presented in a webinar format), and provides articles, discussions, links, and other resources of interest to IBM IMS practitioners. Anyone with an interest in IMS is welcome to join the Virtual IMS user group and share in the knowledge exchange.

To share ideas, and for further information, contact [trevor@itech-ed.com](mailto:trevor@itech-ed.com).

The Virtual IMS user group is free to its members.