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Exploring the IMS Catalog Using the Metadata and IMS Open Database (ODBM)

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Catalog Metadata definition in DBD and PSB source

- IMS 12 HALDB Catalog
  - Contains information about IMS program resources, database resources, and relevant application metadata
  - Database Metadata
    - describes a physical database
  - Application Program Metadata
    - describes application program view of the data in the database
      - Arrays and Structures
      - Field data types and data type conversion
      - Field redefines
      - Alternative Field maps for a segment
  - ACBGEN
    - Used to auto-populate the catalog
- Benefits
    - consolidates the application program data requirements into trusted location

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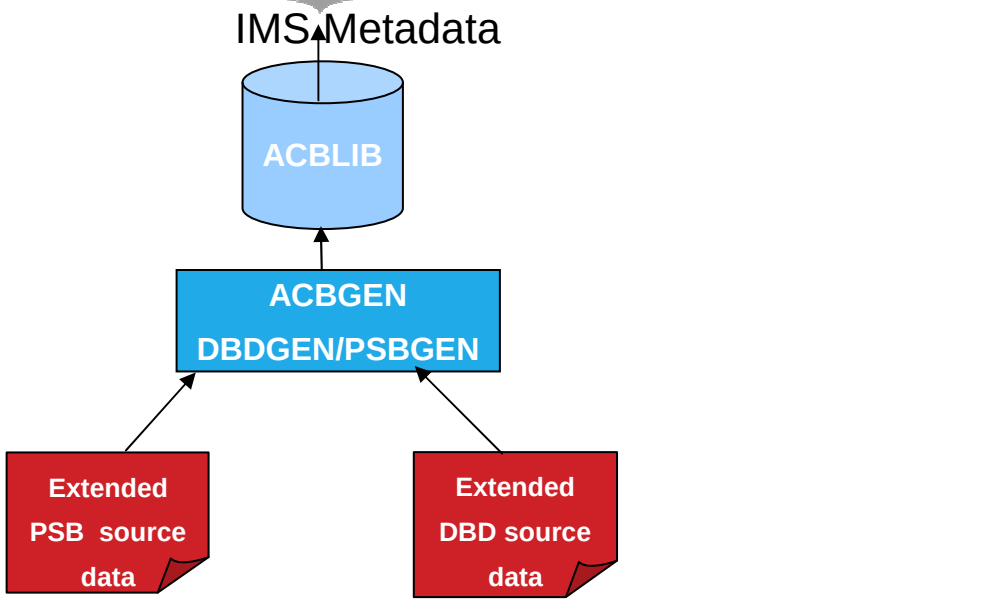
IMS Catalog Metadata

- Database and Application Program resources are managed by IMS
  - –IMS Catalog
  - –database definitions
  - –Segments, Mappings, Fields and data types
  - – program specifications



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PSB PCB statements changes

- PCB
  - EXTERNALNAME=
    - An optional alias for the PCB label or the PCBNAME= parameter
    - Java application programs use the external name to refer to the PCB
  - REMARKS=
    - Optional user comments. A 1- to 256-character field. Added to PSBGEN statements

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DBD statement changes

- DBD
  - ENCODING=
    - Specifies the default encoding of all character data in the database defined by this DBD.
    - This value can be overridden in individual segments or fields.
- SEGM
  - EXTERNALNAME=
    - An optional alias for the NAME= parameter used by Java application programs to refer to the segment.
- FIELD
  - CASENAME=
    - The name of the map case when alternative mappings are defined for the fields in a segment
  - DATATYPE=
    - Specifies the external data type of the field.
  - EXTERNALNAME=
    - An optional alias for the NAME= parameter used by Java application programs to refer to the field.
- DFSMARSH
  - Specifies the DATATYPE converter routine to transform binary data to external data format
- DFSMAP
  - Defines alternative field mappings in a segment.
- DFSCASE
  - Defines a map case for a segment type that uses DFSMAP alternative field mapping.

- REMARKS=
    - Optional user comments. A 1- to 256-character field. Added to DBDGEN statements

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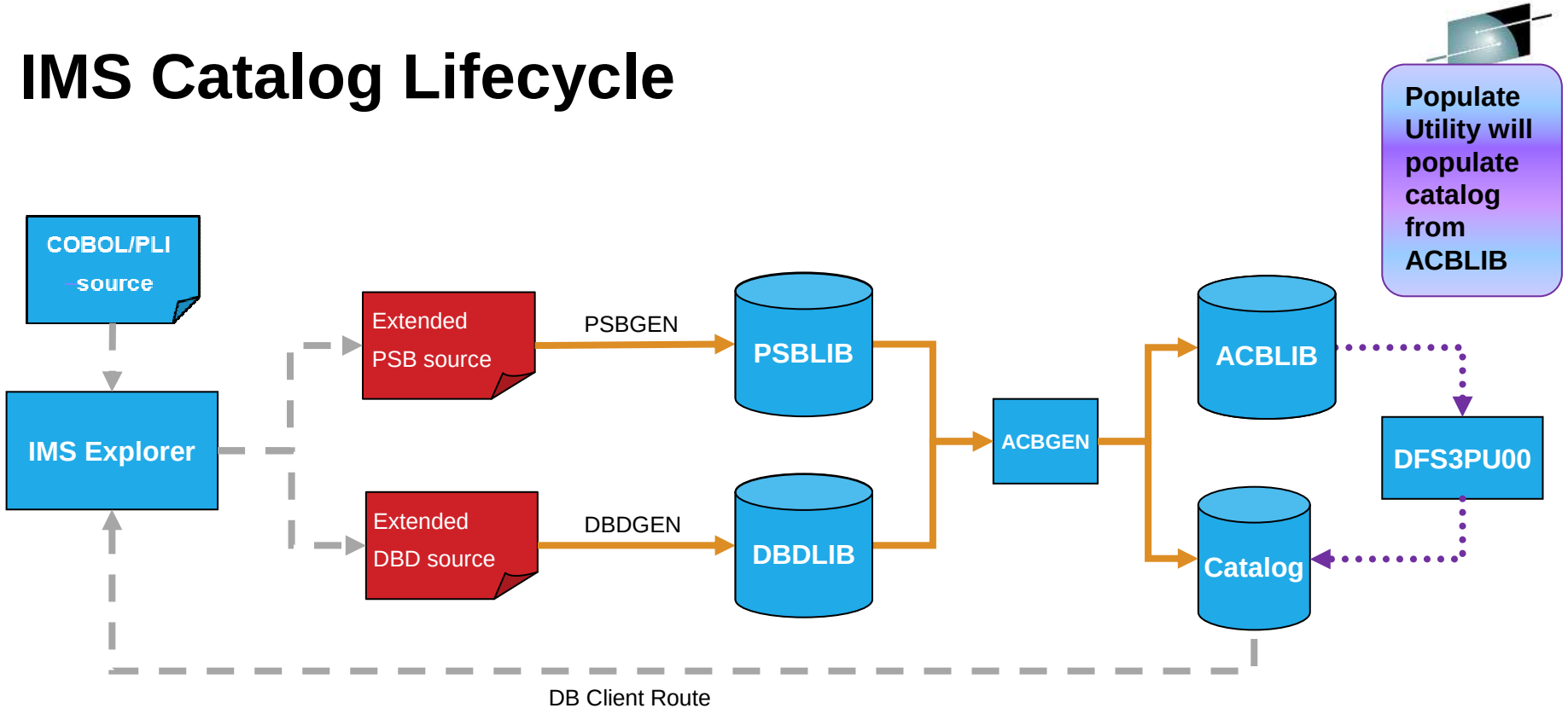
IMS Catalog Lifecycle



- ACBGEN will populate ACBLIB and catalog in same UOW
  - Populates ACBLIB with *standard* ACB info and *extended* info
  - Populates the catalog with *extended* info
- Key points
  - Only way to update catalog is via the Populate Utility or ACBGEN process
  - Extended info stored in ACBLIB members for recoverability
  - Extended info is acquired via the IMS Explorer

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Immediate Benefits

- All Universal drivers leverage the IMS catalog
  - Trusted online (IMS) source for metadata used by the drivers
  - Direct access to IMS metadata in the catalog
  - No longer require the separate Java metadata class
    - Virtual deployment support
  - No longer file-system dependent for metadata
    - Virtual deployment support
  - Metadata is trusted and up-to-date

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Application programming with the IMS 12 Catalog

- IMS catalog resident PSBs for application programs
  - DFSCP000 - High-level assembler and COBOL applications
  - DFSCP002 PL/I - applications
  - DFSCP003 - PASCAL applications
- The following PCBs are included to support different catalog processing models:
  - DFSCAT00 - The primary PCB to access all data in the catalog database..
  - DFSCATSX - Use this PCB to access the catalog database via the catalog secondary index.
  - DFSCATX0 - Use this PCB to process the catalog secondary index database.
- All catalog processing is performed with PROCOPT=G.
- GUR call
  - application programs can use the Get Unique Record (GUR) DL/I call to retrieve catalog database record

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GUR Call

- New “GUR” DL/I call
  - Get Unique Record
  - Restricted to use with IMS Catalog database
- Functions like a GU followed by a series of GNP calls
- Returns the entire database record in one call
  - Saves overhead of issuing GU & GNP to retrieve all the metadata for a catalog member
  - Using an AIB token, the call can be continued if the I/O area is too small for entire catalog database record
- Data returned will be in XML format
  - The XML schemas are included in the IMS.ADFSSMPL data set:
    - DFS3XDBD.xsd (for DBD records)
    - DFS3XPSB.xsd (for PSB records)
- Support added for DFSDDLT0 and IMS REXX

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GUR Call…

- IMS catalog has a structure that uses a header segment as the root for each record.
  - Each header segment instance has either a PSB or DBD child segment instance.
- **GUR AIB IOAREA HEADER PSB**
  - This call locates the first record, which is always a DBD record because DBD precedes PSB in alphanumeric order.
- **GUR AIB IOAREA HEADER (TYPE == PSB) PSB**
  - A GUR call that is issued without a qualification at the PSB or DBD level retrieves the record for the member that is currently active in the ACB library.
- **GUR AIB IOAREA HEADER (RHDRSEQ == PSB BMP255)**
  - GUR call fails if there is no active ACB library member for BMP255
  - AIB return code X'108' and reason code X'338'
- **GUR AIB IOAREA HEADER (RHDRSEQ = PSB BMP255)**
  PSB (TSVERS ==xxxxxxxxxxxxx)
  - To retrieve the record for an inactive or removed ACB library member, add an SSA qualification for the correct ACB generation timestamp

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SSA enhancements

- Segment search arguments (SSAs) can now be based on the offset and field length of the target segment
  - Allows users to issue queries that qualifies on non-searchable fields by specifying the field's offset, length and value
  - SQL
    - Universal Drivers will detect a non-searchable field in the WHERE clause based on Catalog metadata and will internally convert the SSAList qualification an offset
  - DLI
    - Universal Drivers will detect a non-searchable field in the SSAList based on Catalog metadata and will internally convert the qualification to an offset

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SSA support for field offset

- New SSA format
  - Allows searching by offset and length instead of field name
  - Fields are no longer required to be defined in the DBD
- Support will be added for DFSDDLT0 and IMS REXX
- Performance will be the same as non-key field search
  - IMS will scan the database looking for matches
  - Qualification on root key reduces impact of scan
- SSA will contain 4 byte offset and 4 byte length followed by operator and value
- A field not found will return a normal GE

- To be delivered via service process

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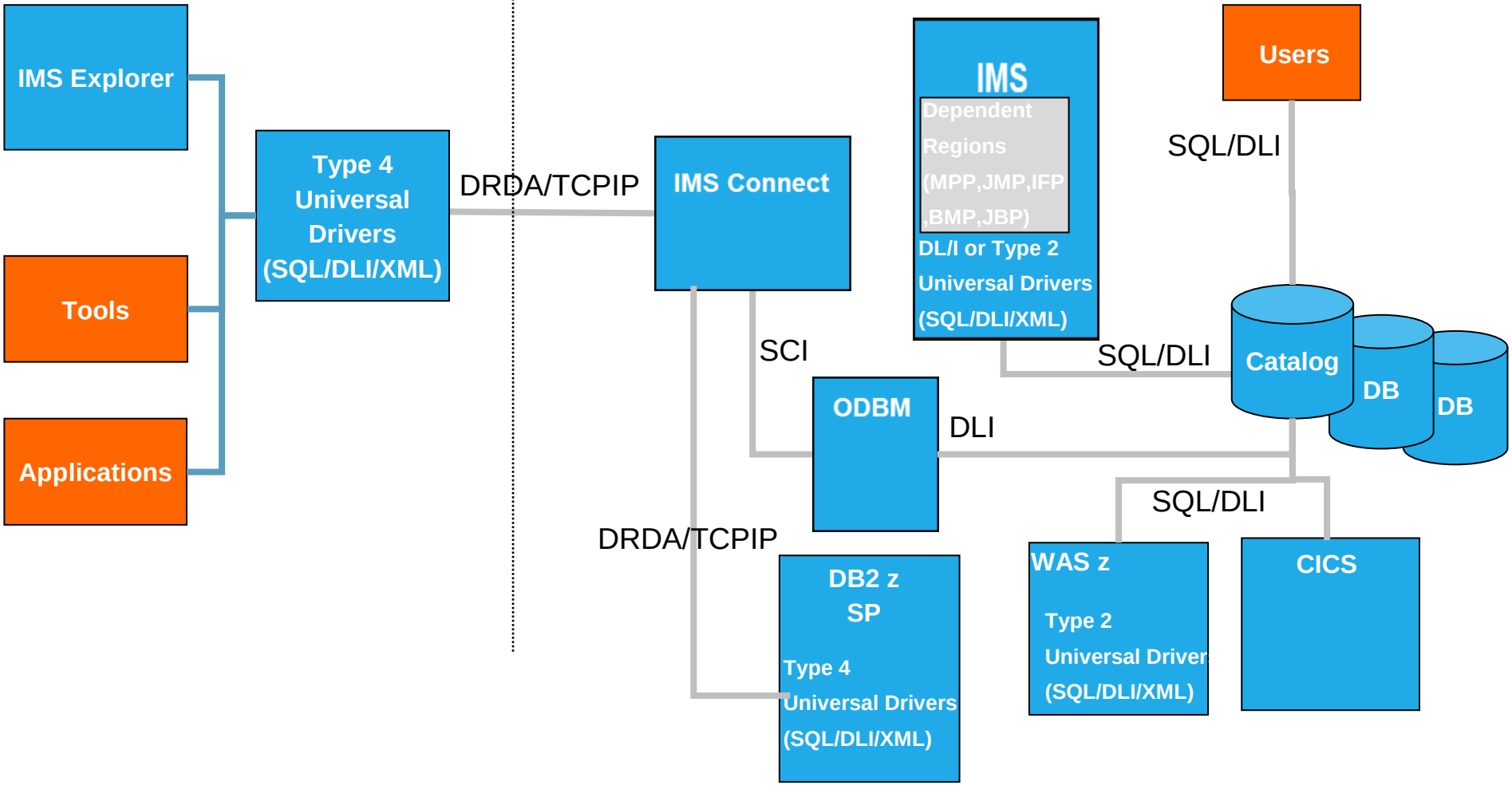
Runtime Catalog Access



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IMS Catalog Supported Interfaces

- Open systems
  - Universal drivers - Type 4
    - SQL and DLI interfaces directly to the catalog
    - XML - render catalog information as XML instance document
- z/OS
  - Universal drivers - Type 2 and Type 4
    - SQL and DLI interfaces directly to the catalog
    - XML - render catalog information as XML instance document
  - Traditional IMS languages
    - DLI access directly to the catalog
    - Batch access supported

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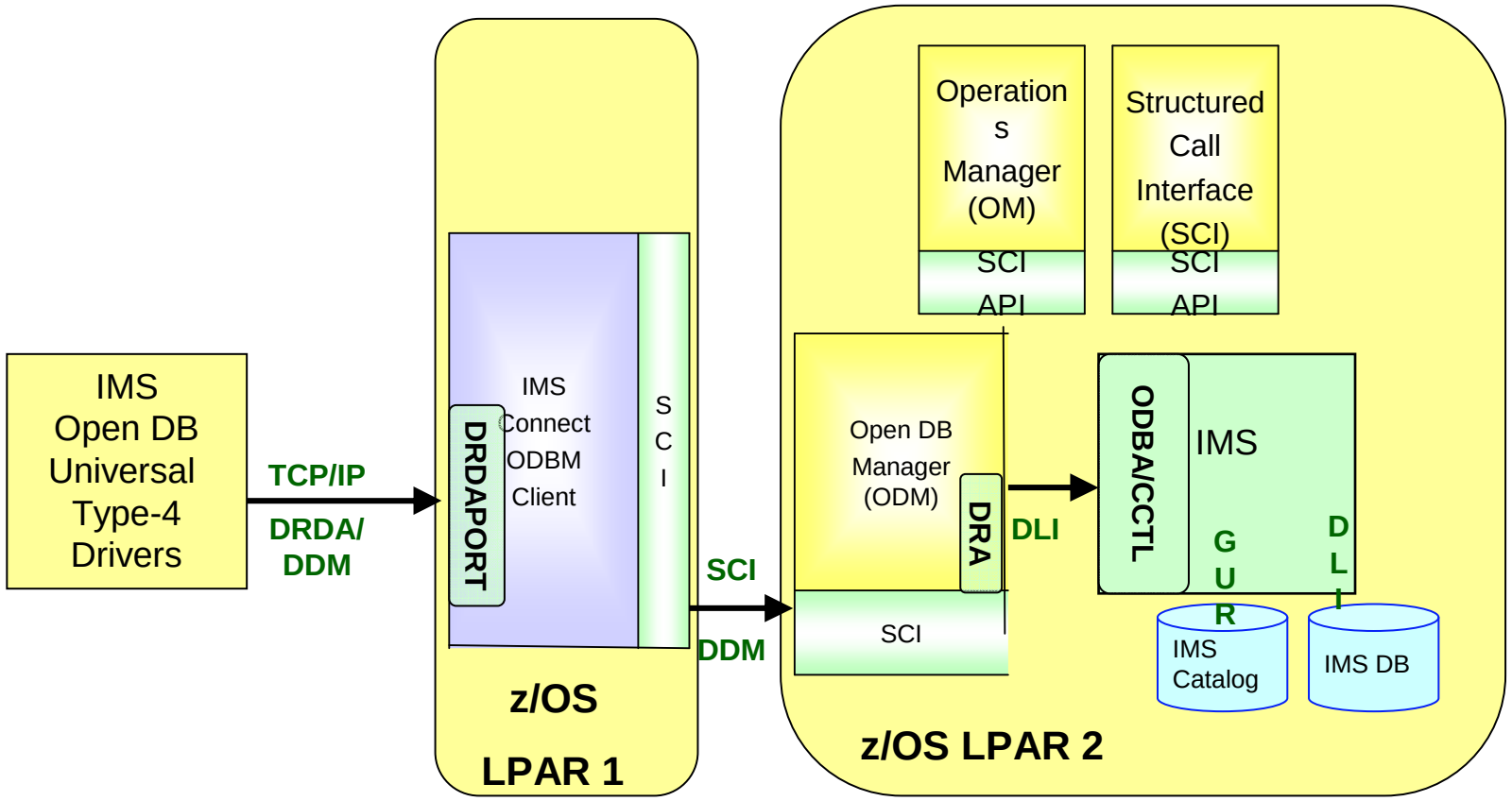
Open Database Components



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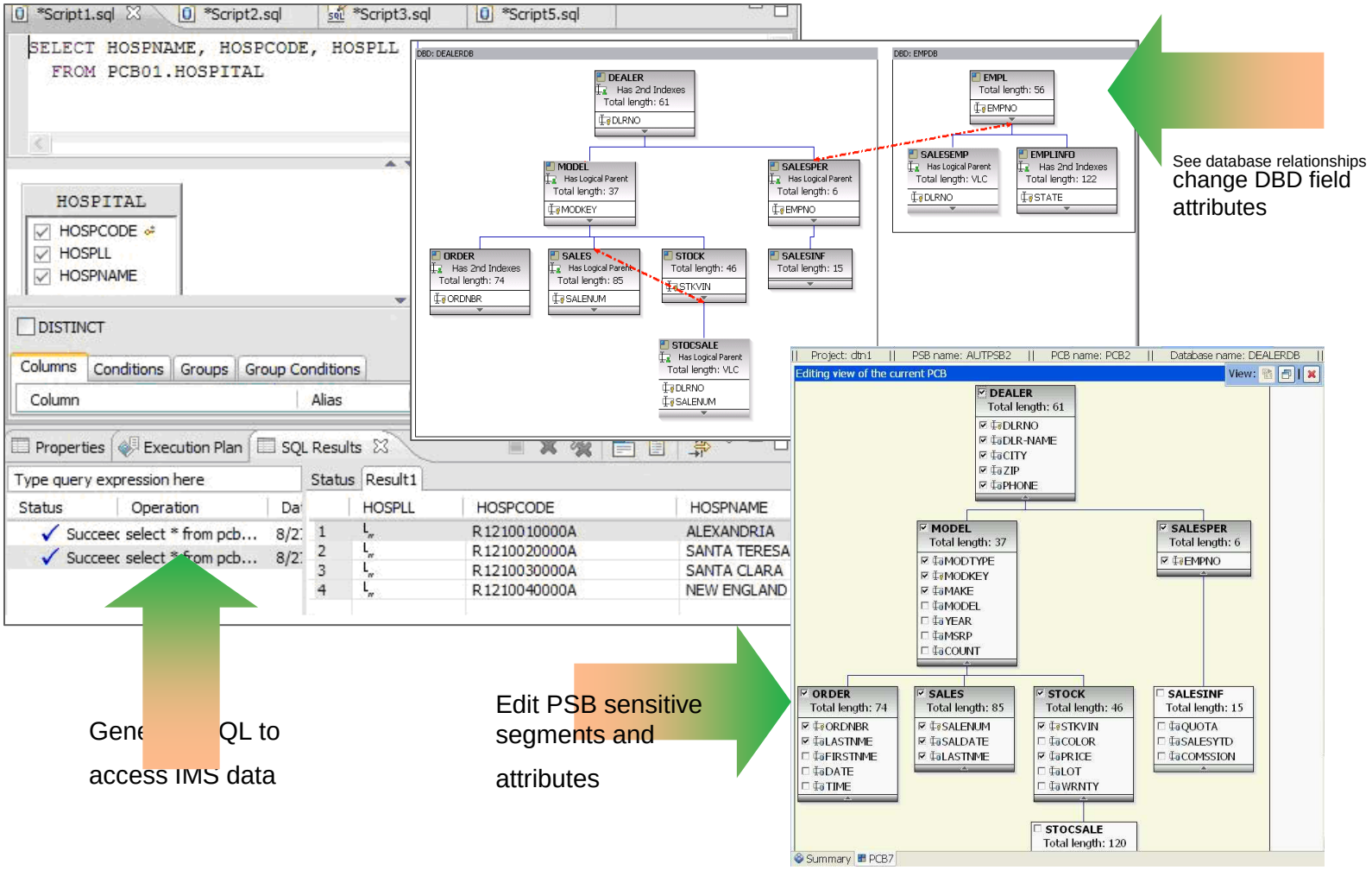
IMS Enterprise Suite V2.1 Explorer for Development



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IMS Enterprise Suite V2.1 Explorer for Development

- Visualization and editing of IMS Database and Program Definitions
  - Provide graphical editors to:
    - Display IMS database hierarchical structures
    - Display/create/edit PSBs
    - Change/add fields on a DBDs
  - Import Cobol CopyBooks and PL/I Structures to a database segment*
  - Generate of DBD and PSB source
- Ability to easily access IMS data using SQL statements
  - Leveraging IMS Universal JDBC driver
- Ability to access the IMS Catalog
- Connectivity to the z/OS system
  - Browse a Data Set and submit JCLs
  - Import and export DBD and PSB source files from a Data Set to the IMS Explorer, and vice-versa
- Supports cross-product integration:
  - IBM® Rational® Developer for System z®
  - IBM Optim™ Development Studio
  - IBM Problem Determination Tools Plug-ins for Eclipse
- Benefit
  - Simplify IMS application development tasks

*Requires RDz 8

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IMS Enterprise Suite V2.1 Explorer for Development

- IMS 12 HALDB Catalog Metadata
  - Universal Driver Type 4 connection
  - Can add COBOL or PL/I metadata to the catalog
    - *Direct update of the catalog metadata is not available*
      - *Requires intermediate ACBGEN to populate the catalog with the extended information*
- PSBs and DBDs editing
  - Send updated DBDGEN and PSBGEN source files to the host
  - run DBDGENs, PSBGENs, ACBGENs, and catalog population

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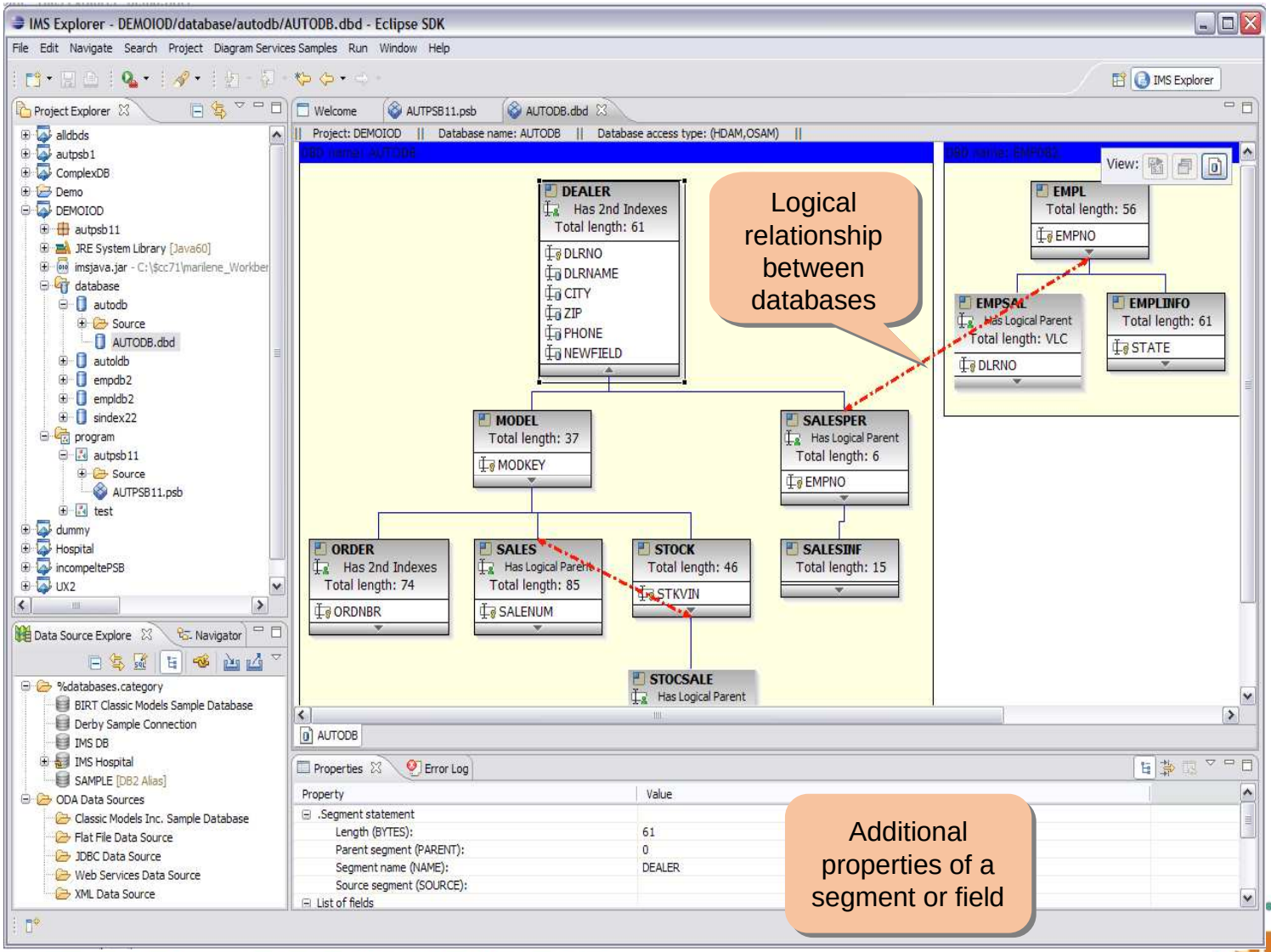
IMS Enterprise Suite V2.1 Explorer for Development
View physical IMS database structure



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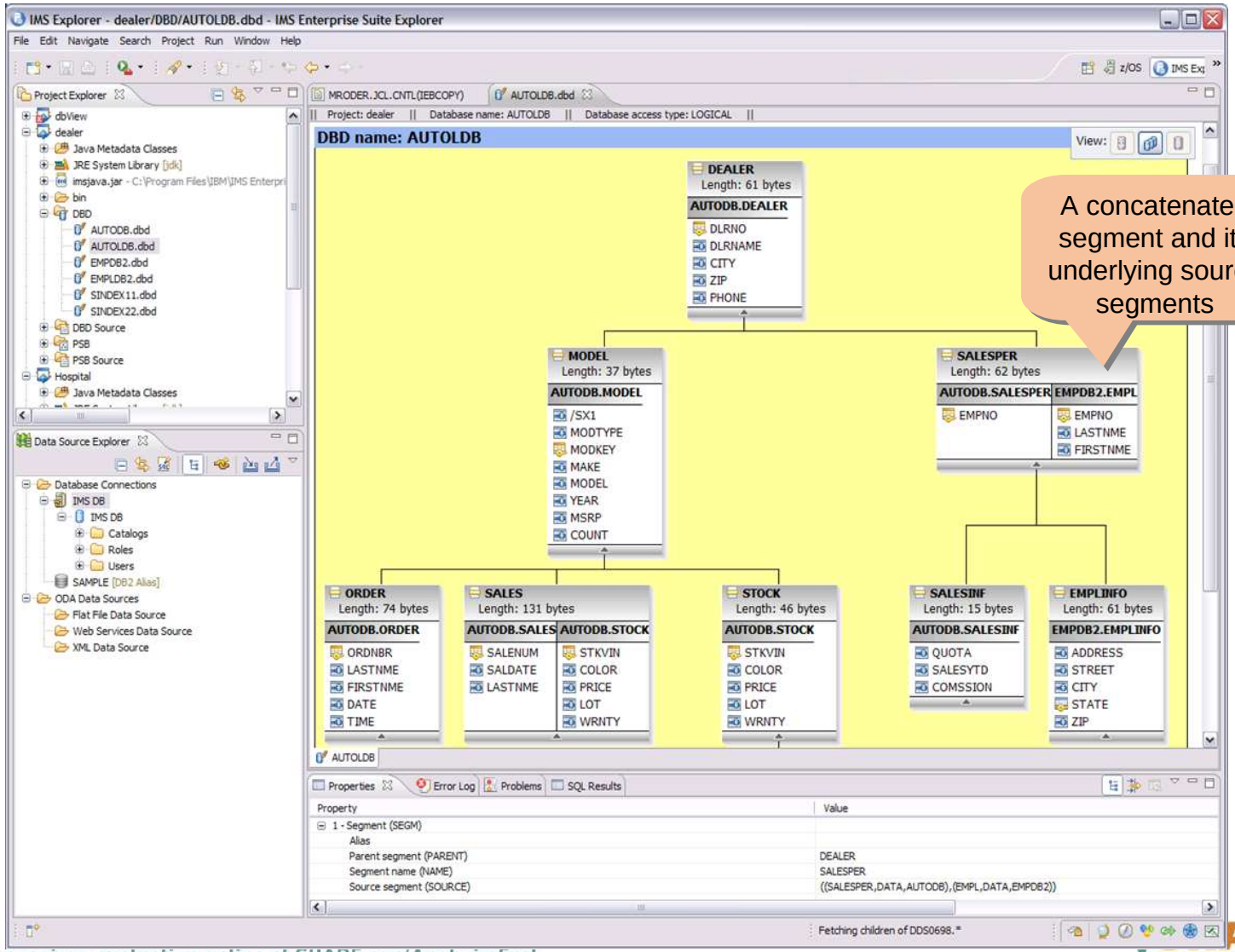
IMS Enterprise Suite V2.1 Explorer for Development
View logical IMS database structure



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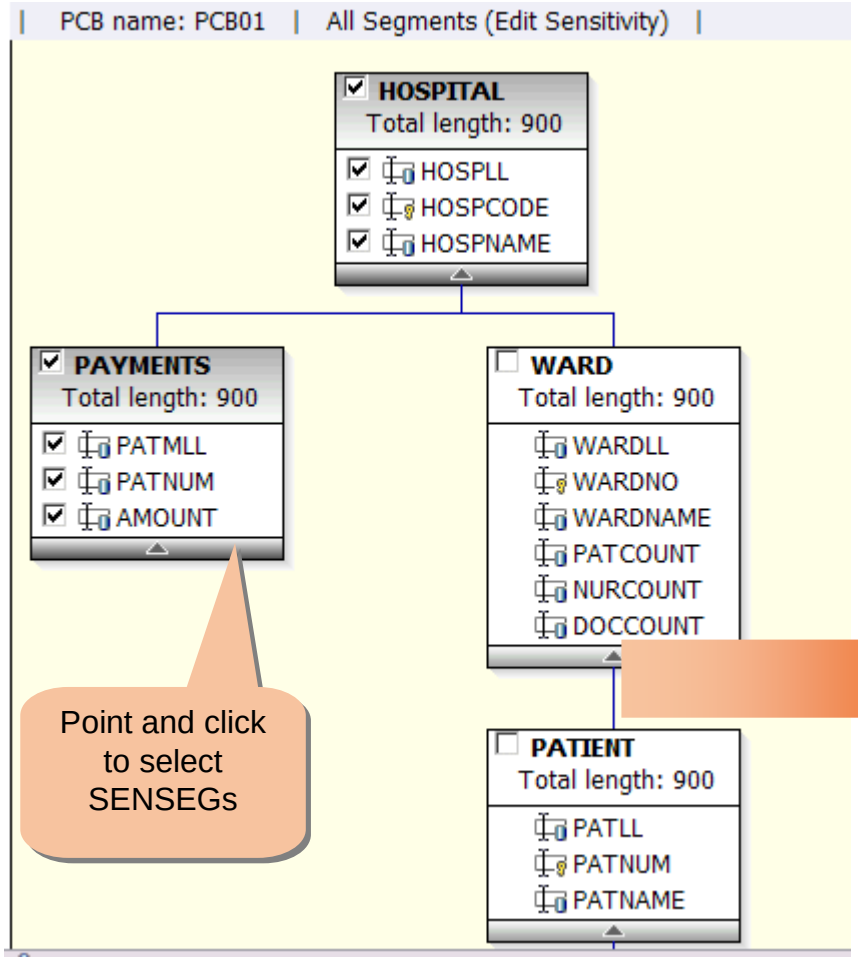
Build PCB definition




```
*************************************************************
*        PCB NUMBER 5       DB    DEDBJN21
*************************************************************
 PCB       TYPE=DB,DBNAME=DEDBJN21,POS=M,PROCOPT=A,KEYLE
              PCBNAME=PCB01
    SENSEG   NAME=HOSPITAL,PARENT=0
    SENSEG   NAME=PAYMENTS,PARENT=HOSPITA
    SENSEG   NAME=WARD,PARENT=HOSPITAL
    SENSEG   NAME=PATIENT,PARENT=WARD
    SENSEG   NAME=ILLNESS,PARENT=PATIENT
    SENSEG   NAME=TREATMNT,PARENT=ILLNESS
    SENSEG   NAME=DOCTOR,PARENT=TREATMNT
    SENSEG   NAME=BILLING,PARENT=PATIENT
*************************************************************
*         PCB NUMBER 6       DB    IVPDB1
*************************************************************
```

Generated PSB source

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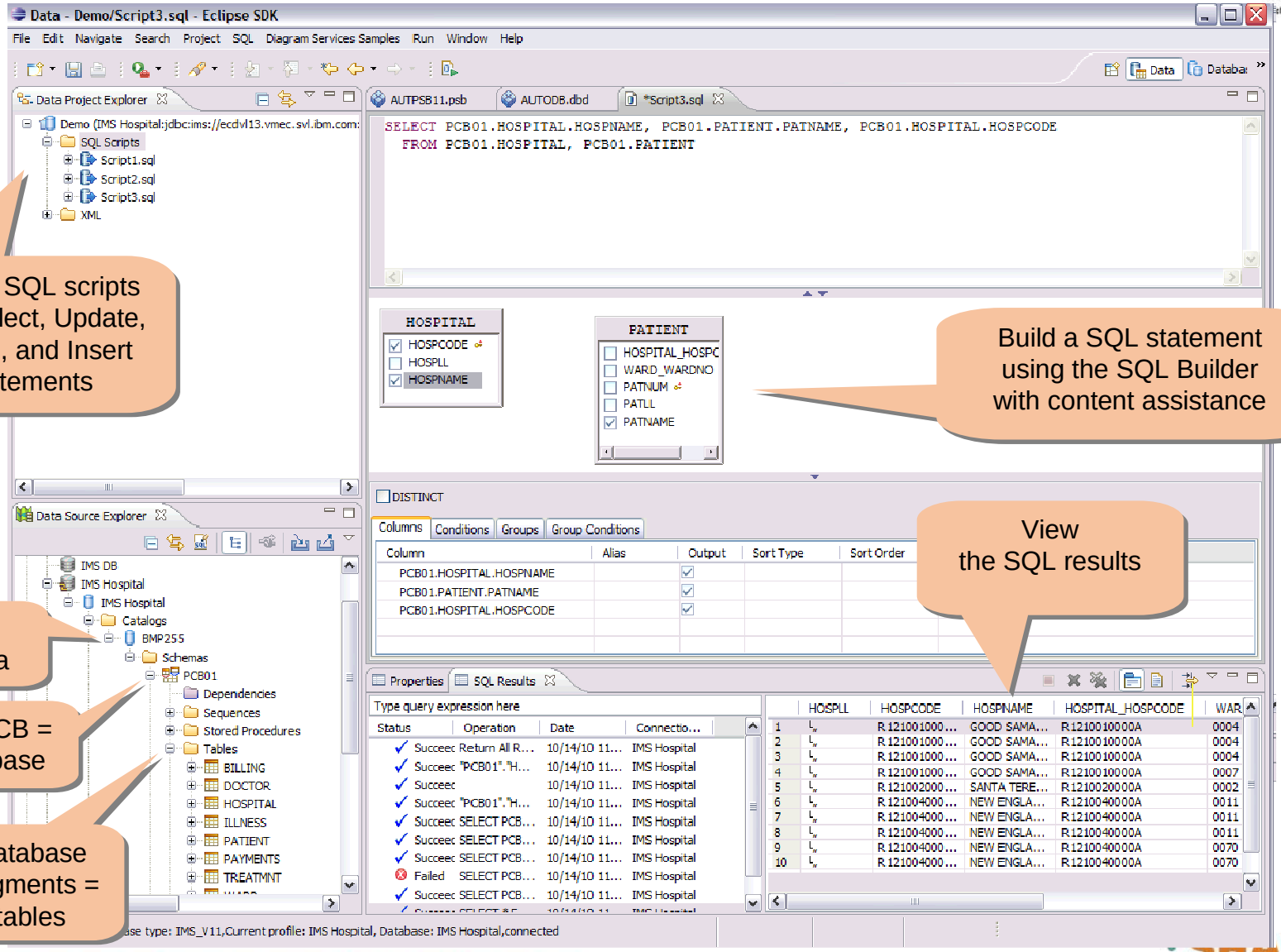
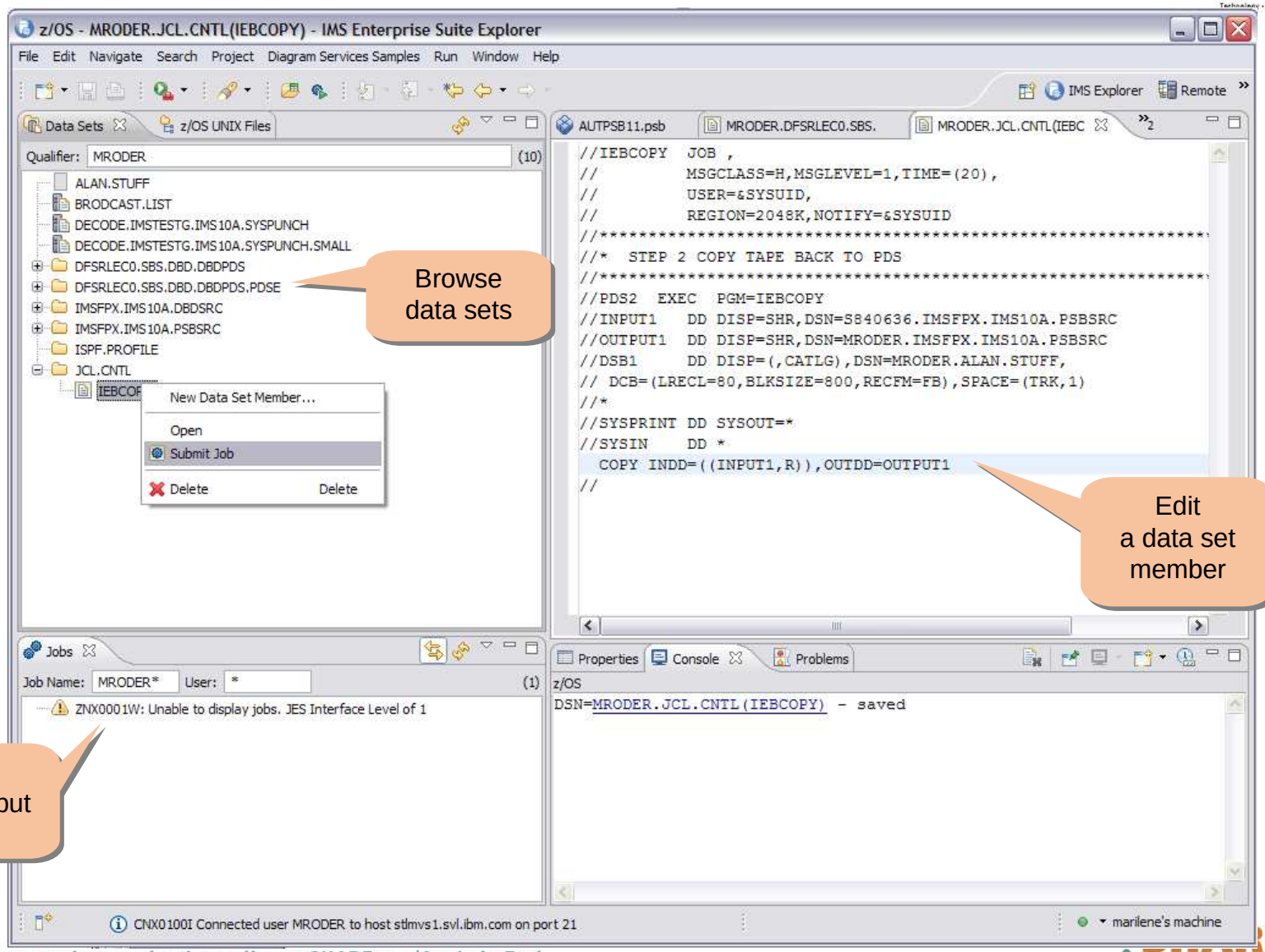
IMS Enterprise Suite V2.1 Explorer for Development
Query IMS database with Universal JDBC driver



IMS Enterprise Suite V2.1 Explorer for Development
Browsing Data Sets and Submitting JCL's



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System z Social Media

- System z official Twitter handle:
  - @ibm_system_z

- Top Facebook pages related to System z:
  - Systemz Mainframe
  - IBM System z on Campus
  - IBM Mainframe Professionals
  - Millennial Mainframer

- Top LinkedIn Groups related to System z:
  - Mainframe Experts Network
  - Mainframe
  - IBM Mainframe
  - System z Advocates
  - Cloud Mainframe Computing

- YouTube
  - IBM System z

- Leading Blogs related to System z:
  - Evangelizing Mainframe (Destination z blog)
  - Mainframe Performance Topics
  - Common Sense
  - Enterprise Class Innovation: System z perspectives
  - Mainframe
  - MainframeZone
  - Smarter Computing Blog
  - Millennial Mainframer

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Summary

- IMS 12 HALDB Catalog
  - Contains information about IMS program resources, database resources, and relevant application metadata
  - ACBGEN
    - Used to auto-populate the catalog
- IMS Enterprise Suite Explorer for Development
    - Generates DBD/PSB source to populate the catalog

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