DATABASE MANAGEMENT GROUP

DESCRIPTION of STAFF, RESPONSIBILITIES, and PRIORITIES

OBJECTIVES

The following document addresses three major objectives of the Data Base Management charter. In summary, those objectives are:

1.To identify the functions, activities, and responsibilities of a DataBase Management Group.

2.To define the roles, responsibilities, and skills for DataBase Management staff members.

3.To identify the support required for traditional and Information Engineering methodologies.

The analysis of the State of Nebraska IMServices needs, regarding Data Base Management services, was the product of a combined and multiphase investigation. As a result of consultation with James Martin and Company, interviews with all IMServices Application Solutions front line managers and a select number of contracted consultants, and interviews with Data Base Administrators and managers of other large private sector companies, the following document addresses both the analyzed needs of IMServices and recommendations to address those needs by a Data Base Management group (DBM).

RESPONSIBILITIES

The responsibilities, and the priority of those responsibilities in the DBM group is and must be:

1.The protection of all production data from loss or corruption

2.To provide support for the development and the maintenance of application systems that collect, process, or report data to the clients in the most cost effective and efficient manner possible.

There are currently 216 IMS databases and indexes, 1730 DB2 tablespaces, and 2,753 DB2 indexes defined in the production environment. To be responsible for these data sets, the DataBase Management group must have significant influence or complete control over the following items:

1.Production database data sets.

- The implementation of physical data bases.

- Assignment of data base data sets to appropriate DASD units, with sufficient primary and reserve space allocation, to insure efficient and uninterrupted access to those data sets from production Application systems.

- Assist and/or review of plans to load or modify databases.

- Assessment of current data base storage requirements and review of current and projected data growth.

2.Production DB2 Utilities.

- Create and review DB2 production utility needs with the appropriate Development Project Team.

- Determine or review the timing, scheduling, and priorities of utilities to utilize them in the most efficient and effective manner possible.

- To develop and/or make available report(s) or information, which is a current assessment of database size, space utilization, and record condition (e.g. segment splits, overflow usage, etc).

- Backup and protect the DB2 production data from unforeseen hardware or system failures. These backup datasets are not intended to recover from errors caused by application programming logic.

To provide advice and/or expertise in the development of cost effective and efficient systems, DBM will participate in the following areas:
1.IE Business Area Analysis (OBAA and DBAA), Business System Implementation (BSI, including BSD, TD, and Construction), and Transition.

- A DBM staff member will participate in the Reviews available at the conclusion or near conclusion of an Overview Business Area Analysis (OBAA). A general and complete understanding of the business requirements will be attained at this stage.

- A DBM staff member will be attached to a Detailed Business Area Analysis (DBAA). This staff member not only will acquire more detailed knowledge of the business requirements, but also, will be available for advice or consultation regarding evolving physical database needs.

§A DBM staff member will be assigned to a BSI (Business System Implementation). This staff member will create or modify physical databases (DB2), provide model data bases or tables, create master utility jobs for data base or tablespace maintenance, and provide system design and program call access reviews as appropriate for the project.

2.Traditional Systems Development

▪DBM staff member will be assigned to a traditional system project team to help create or modify physical data bases (DB2), provide model data bases or tables, create master utility jobs for database or tablespace maintenance, and provide system design and program call access reviews as appropriate for the project.

3.Testing Environment Coordination

▪The DBM staff will provide both advice and schema to coordinate and facilitate the movement of IMS databases, DB2 objects, and accessing programs through the progressive test stages. Methods will be developed:

- ▪for more universal ownership of plans and objects,
- ▪to better segregate changes in each test stage
- ▪to control the intentional movement of data sets and accessing programs through the required stages.

ACTION PLANS AND PRIORITIES

1.Action Plan 1

▪The DBM group will reallocate and/or reorganize all data base data sets (as necessary) to prevent and eliminate production abends caused by inadequate space allocation.

§Diagrams and/or charts will be produced to display packs available for production database and tablespace storage, controllers and channels as appropriate to understand access paths, and dataset distribution among these devices.

§A study of all data set placements and allocations will be done to determine the strategy and timing of dataset reallocation or movement.

§Currently available tools and/or utilities will be utilized to proactively monitor all DB2 data sets. The need for additional tools or utility capabilities will be identified and will be forwarded as needed. (Note: if additional tools and/or utilities are made available through the Space Monitoring Tools project, they will be incorporated into the procedures or replace the procedures established under this line item).

- ♦DB2PM is needed for DB2 Performance Monitoring
- ♦The Candle Omegamon will be used to Monitor System performance.
- ♦Platinum Detector will be used to Monitor Application SQL tuning and performance.

▪The use of DB2 STOGROUPS and the definition, creation, alteration of production tablespaces using DB2 DDL statements will be introduced.

- ♦The need for SYSADM, SYSCTL, or DBADM authority will be reviewed and granted.
- ♦An authorization group ID will be created for DB2 and RACF purposes.
- ♦The use of individual Id's and/or continuous access to RACF Group Id's which are defined in DSNZPARM with SYSADM authority need to be reviewed and restricted.

▪Current standards will be reviewed and new standards will be introduced to address DB2 tablespace and IMS database integrity issues. These standards will specifically determine the following system requirements:

- ▪Access and control security needed to protect data base datasets from inadvertent or unauthorized deletion.
- ▪The use and/or the frequency of use of utilities to image copy, reorganize, rebuild, and recover data sets.
- ▪Requirements for all future program development with regard to the allocation, locking, and freeing of resources through program execution.
- ▪The use of product or vendor utilities to create and/or maintain database datasets.

2.Action Plan 2

- Checkpoint/Restart logic **should be** coded in all significant update programs to eliminate unnecessary database backouts or restores. Programs altered with this logic would further be eligible for use in Action Plan 3 described below.

    - A current, significant but manageable system will be selected to use as a pilot project.
    - A small group of programmers and analysts (1 to 3) will be assigned to learn Checkpoint/Restart coding techniques. This group will be given the task of coding, testing, and implementing the changed update programs.
    - Procedures will be changed to utilize dynamic backout for these changed IMS and/or DB2 update programs.
    - A parallel volume test will be conducted to verify the benefits of these coding changes.
    - Additional systems will be targeted to be changed.

3.Action Plan 3

- The full use of DBRC (IBM's Data Base Recovery Control), DBCTL, and possibly IMS Control Regions should be investigated.

    - These facilities would allow multiple batch processing jobs to run simultaneously which may free program scheduling from RECON and log data set dependencies.
    - The use of GENJCL (Generate JCL) will provide the capability to automatically produce recovery JCL for IMS databases.
    - The use of image copies and batch jobs logs can be used to recover a database to specific point.
    - Image copies should be taken before the batch cycle and at completion of batch cycle.
    - Timely and effective Disaster Recovery provisions would be available.

- Review current procedures and jobs which are used for data base recovery or control, and modify as required.

4.Action Plan 4

- In general, and on an adhoc basis, the DBM staff will be available, either to provide answers or to seek solutions to and DB2 design or

test questions. In its formal capacity, DBM will provide support for the following development activities in the following order of priority:

- All IE projects as required and designated under the Development Coordination charter.
- All traditional projects, which involve DB2, database design and/or access.
- Test and/or access problems in the Client Acceptance Test environment.
- General consultation in all other test environment matters, as required.
- Determine the need and the availability of Master files or libraries to contain skeleton JCL and/or DDL statements, separate test stage Control Blocks, and master copies of Monitors or program flows to supplement program documentation.

Data Base Administration and Data Base Management

Introduction

In an effort to help define Data Base Management, the current DBM group has studied industry standards and IBM's recommendations over the past years. DBM was able to obtain information about other Database Management shops through a formal interview process conducted last spring, Great Plains DB2 User Group meetings, and attending various database administration courses with other professionals around the country. Some organizations from which DBM gathered information include Mutual of Omaha, Union Pacific, Centel, OPPD, and MCI. IBM recommendations were gathered from various IBM manuals (IMS/VS Database Administration Guide, DB2 Database Administration Guide, etc.) and DBM members attending various IBM DB2 and IMS Database Administration courses and workshops.

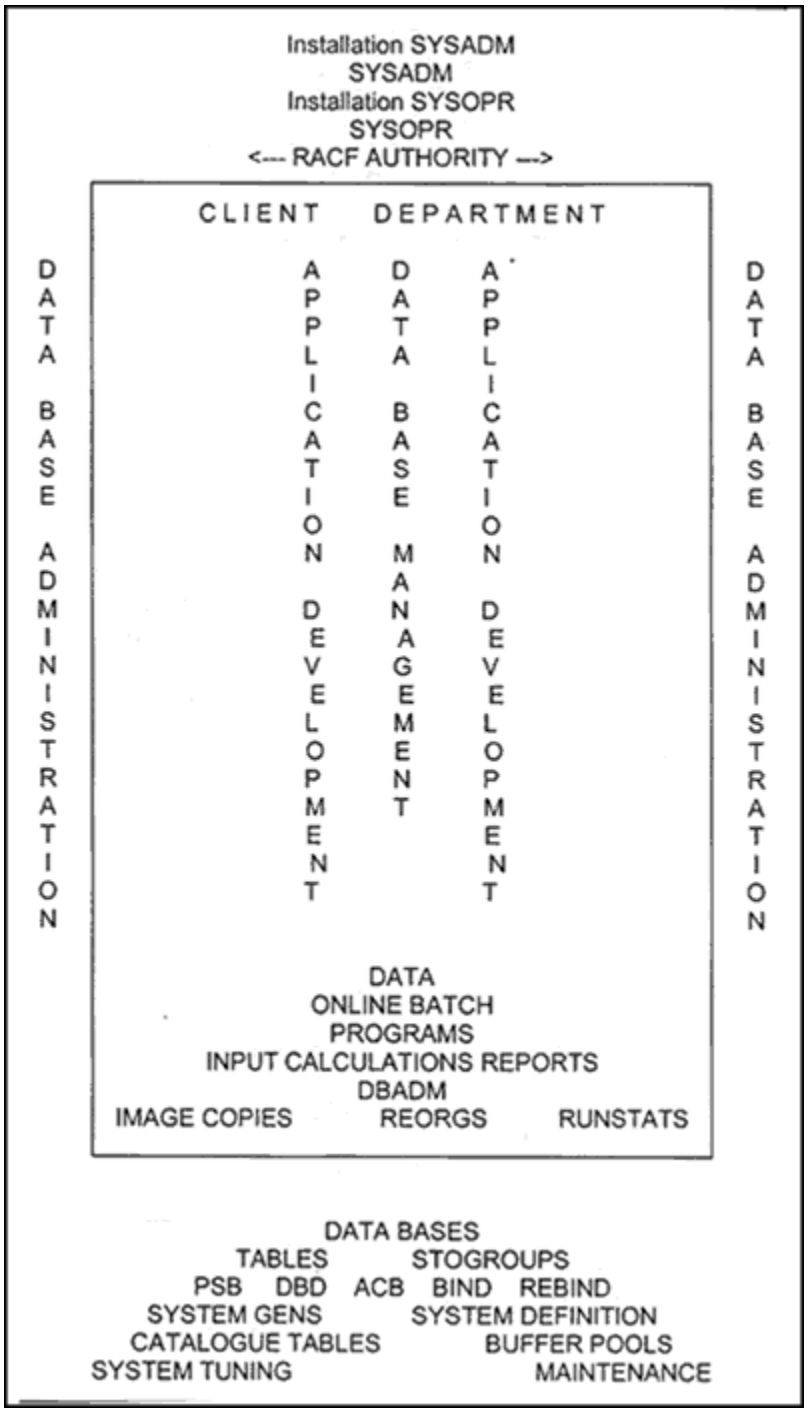
Throughout the study, DBM found that other shops, along with IBM, consistently broke database management into separate functional areas. The separate areas are Database System Administration/Programming (DBSA/P) and Database Administration (DBA). The traditional DBSA/P area (known as Data Base Administration in IMServices) is responsible for managing the components that make up the Database Management System (DBMS) (system objects and data). The traditional DBA area (known as Data Base Management in IMServices) is responsible for

managing the objects that make up the application structures (client objects and data).

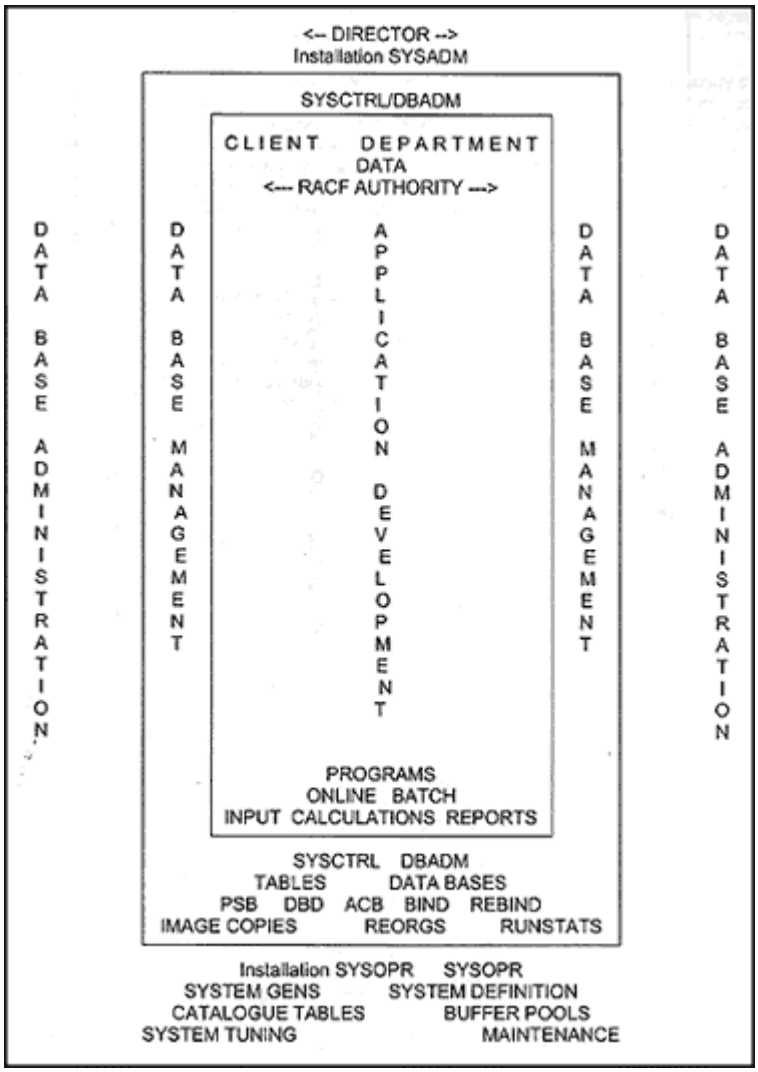
The following is a list of responsibilities for a DBA and a DBM with regard to the DBMS's for the State of Nebraska, DB2 and IMS. The responsibilities listed for DBA contain only those responsibilities regarding DB2 and IMS. It does not contain any other system responsibilities, such as VSAM or CICS. The responsibilities listed for DBM area are for similar areas.

The following list was created to show the different responsibilities of Data Base Administration and Data Base Management. For a more complete definition of listed tasks, see the IBM IMS and DB2 DATABASE ADMINISTRATION GUIDES for the respective DBMS.

FORMER CENTRAL DATA PROCESSING



CURRENT IMSERVICES



Data Base Administration and Data Base Management

IMServices Responsibilities

Data Base Administration and Data Base Management will be assigned or granted a group of DB2 and IMS administrative authorities as listed below. In general, the Data Base Administration group will be assigned or granted those administrative authorities which are needed and necessary to install, monitor, and maintain the IMServices DB2 and IMS systems environments. In general, the Data Base Management group will be

assigned or granted those administrative authorities which are needed and necessary to fully support the development and the implementation of applications programs, DB2 objects, and IMS control blocks.

Authorities

Administrative authorities will be divided (although sometimes shared for specific purposes) in the following manner:

1.**Data Base Administration** will be assigned or granted the following DB2 authorities:

- Installation SYSADM (A secondary authorization id used for DB2 system install, maintenance, and emergency)

- Installation SYSOPR

  This authority has the following implied authorizations:

  - ARCHIVE

- SYSOPR

  This authority has the following implied authorizations:

  - DISPLAY
  - RECOVER
  - STOPALL
  - TRACE

- DBADM **(TO BE USED FOR SYSTEM SUPPORT DATA BASES AND RELATED OBJECTS)**

  This authority has the following implied authorizations for DBCTRL and DBMAINT:

  - DROP
  - LOAD
  - RECOVERDB
  - REORG
  - REPAIR
  - CREATETAB
  - CREATETS

- ♦DISPLAYDB
- ♦IMAGCOPY
- ♦STARTDB
- ♦STOPDB
- ♦STATS

▪BINDADD (for system support packages and/or plans)

▪BSDS

▪MONITOR1

▪MONITOR2

2.**Data Base Management** will be assigned or granted the following DB2 authorities:

▪PACKADM

▪DBADM **(TO BE USED FOR APPLICATIONS DATA BASES AND RELATED OBJECTS)**

This authority has the following implied authorizations for DBCTRL and DBMAINT:

- ♦DROP
- ♦LOAD
- ♦RECOVERDB
- ♦REORG
- ♦REPAIR
- ♦CREATETAB
- ♦CREATETS
- ♦DISPLAYDB
- ♦IMAGCOPY
- ♦STARTDB
- ♦STOPDB
- ♦STATS

▪BINDADD

▪BINDAGENT

▪CREATALIAS

▪CREATEDBA

- CREATEDBC
- CREATESG
- STOSPACE
- Privileges on all tables:
    - ALTER
    - INDEX
- Privileges on all plans:
    - BIND
- Privileges on all packages:
    - BIND
    - COPY
- Privileges on all collections:
    - CREATE IN

3.**Both groups** will be assigned or granted the following DB2 privileges:

- Privileges on Catalogue tables:
    a)SELECT
    b)UPDATE
- Use privileges on:
    a)BUFFERPOOL
    b)STOGROUP
    c)TABLESPACE

See IBM DATABASE Administration Guide, Volume II, Chapter 5 for a full listing and description of DB2 authorities.

Where "GRANTS" are required for any of the above DB2 authorities or privileges, they will be executed with the 'GRANT… WITH GRANT' option.

Data Base Management needs full use of the Platinum toolset. Requires RACF update for DBA.DB2.PLATINUM.* data sets (currently available).

Data Base Management needs full use of DB2 Interactive (currently available).

Responsibilities

Responsibilities will be designated in the following manner:

DATA BASE ADMINISTRATION

1.Install initial DB2 or IMS plus any new releases of DB2 or IMS. This is to include all installation planning (e.g. DASD Requirements, Buffer Pool Sizes, all hardware and software operating system requirements, etc).

DB2 is initially installed on the DBSY subsystem, available only for systems test. New releases or any maintenance will be applied here and tested before migrating up MVS LPARs. Coordination between MVS systems and Database Systems Support is done to insure DB2 is properly installed and that all the "hooks" are in for proper operation. The use and knowledge of SMP/E is required in order to install IBM and certain vendor software. IMS installation is done in a "test" mode 1st then migrated to a more open testing and eventually to production.

2.Test installation of initial/new releases of DB2 and IMS.

Initial testing is on SY1 Lpar DBSY subsystem. Migration to PR1 and eventually production DB2 progresses in a timely matter as more testing is done and we are reasonably sure of success. Coordination will need to be done with the DBM group for more through testing from the "user/analyst" side. IMS testing can progress at first on the batch side and then some isolated CICS testing via DB/CTL subsystem.

3.Control System Security and control and maintain the environment for online programs which use DB2 and/or IMS:

- Protect DB2 and IMS System data sets
- Control connections to DB2 and IMS
- Control DB2 and IMS Authorization Exits
- CICS connections

- IMS connections
- TSO connections
- BMP
- DBCTL
- DBUSS
- Controlling Threads
- Create and maintain RESLIB
- Create and maintain DBD libraries
- Create and maintain PSB libraries
- Create and maintain all productivity tool libraries as required by the tool

RACF security to DB2/IMS datasets is controlled by Data Base Systems. Connections from CICS/TSO will be controlled by Data Base Systems and MVS Systems respectively. Access to the DB2 environment by CICS will be controlled by the RCT, which we coordinate with CICS Systems.

4.Logging

- Control of BSDS
- Control of SYSLOGRNG
- Physical Implementation, Monitoring, and Revising
- Control of Active Logging and all of its components
- Control of Archive Logging and all its components
- Control of Log Buffers
- System Recovery:

    - BSDS
    §Directory (DSNDB01)
    §Catalog (DSNDB06)
    §Work Database (DSNDB07)
    §Active Log

Control of the logs and system catalog backups. The proper logs will be saved so that recovery of data/catalogs can be done for at least 30 days. When DBCTL becomes an active part of IMS, Data Base Administration will be responsible for those system logs as well. All batch logs in IMS procedures will be the responsibility of the Development Group. Database Administration is responsible for Catalog and BSDS recovery. Recovery procedures are in place and documented.

5.Operations (Monitor and Controlling DB2):

- Starting/Stopping DB2 & IMS
- ARCHIVE
- System Monitoring/Control (space usage, contention, etc.)
- DB2 System Trace Activities
- Monitoring Connections and Threads
- Controlling Connections and Threads
- Quiescing (checkpointing) DB2 system
- Resource Control Table

Data Base Administration is responsible for the start and stop of the DB2 subsystems. All associated jobs/started tasks are monitored and check to make sure they are running, as they should be. Scheduling for DB2/DBT downtime is done via a DOWNREQ on IMSERVICESFORMS, this will insure the proper people are notified of a scheduled outage.

6.Control use of Problem Determination Tools:

- Dumps
- Traces

Knowledge in using the various tools for problem determination. These include Omegamon II for DB2, various MVS system dump facilities, and other tools as deemed necessary (IPCS, IBMIN).

7.Performance and Tuning of DB2 system:

- Integrated Resource Lock Manager (IRLM)
  - §Log Manager
  - §DB2 Directory Tables (DSNDB01)
  - §DB2 Catalog Tables (DSNDB06)
  - §DB2 Work Tables (DSNDB07)
  - §Boot Strap Dataset (BSDS)

Using the Omegamon product is a major way of tuning DB2. All the components that make up DB2 also are checked to be sure they fall within some "norms". (DB2DBM1, IRLM). Periodic checks are made of the DB2 catalog tables to determine if more space is needed before they go into extents. Historical reports are used to determine if any bottlenecks exist or may be a potential problem. With Omegamon II for DB2, we are able to determine resource usage and make determinations as to EDM pool size, buffer pool size, thread utilization and other pertinent items that affect the performance of the DB2 subsystems. If there are poor running

threads, a trace facility will be started to determine where the bottleneck exists.

8.Install and maintain associated software for DB2/IMS. DB2 and IMS do not run "alone". There are a number of associated software products that enhances DB2 and IMS performance and make it more user friendly. These products consist of:

- BMC Unloadplus
- BMC Loadplus
- BMC Secondary Index Utility
- Compress IMS
- PSB/DBD Map
- Platinum Products
- Database Attach
- Omegamon II for DB2
- QMF
- File Aid for DB2/IMS
- DB2PM
- Move for DB2
- BMC AR/CTL

9.Develop and maintain standards for system administration.

As new technology evolves, (e.g. client/server), standards and procedures will be reviewed or created as a joint effort between the Data Base Administration and the Data Base Management groups.

10.Front-line oncall for Data Base systems problems or abends.

DATA BASE MANAGEMENT

1.Provides application development support for all agencies and departments served by IMServices.

2.Active participation in all phases of application development including

- Business Area Analysis
- Business Systems Design
- Construction
- Transition
- Traditional Analysis
- Traditional Development
- Traditional Implementation
- Maintenance

3.Logical Database Design:

- Key Identification
- Normalization
- Volume Analysis
- Logical Design
- Cardinality Verification
- Optionality Verification

4.Logical to Physical Transition

- Denormalization
- Column Attributes
- Referential Integrity
- Index Planning

5.SQL Use Analysis

- Optimization
- Access Strategies (joins, unions, etc.)
- DB2 Application Plan Analysis
- SQL Review
- Call Pattern Review

6.DB2 Application Object Creation, Alteration, and Promotion

- STOGROUPS
- DATABASES
- TABLESPACES
- TABLES
- INDEXES
- SYNONYMS

7.DB2 Bind Process

- Test through Production
- Plan definition
- Plan Binds
- Package Binds

8.DB2 Application Plans and Objects authorization control

- Secondary Authorizations IDS
- Authorizations and Grants

9.Prepare and/or execute IMS or DB2 Utilities for Application Objects during the following development phases:

- DB2 object creation
- Implementation
- Maintenance
- Change

10.Recover DB2 Application Objects

11.Monitor and Tune DB2 Application programs, queries, and procedures

12.Monitor and Tune DB2 Application Objects

13.Develop and Maintain standards and procedures for application development and application oriented DB2 objects.

14.Evaluate software tools for DB2 application object maintenance, monitoring, development, etc.

15.Front-line oncall for problems concerning DB2 Application Objects, utilities, and any other application specific database job which cannot be resolved by primary and secondary oncall application analysts.

INTER STAFF COMMUNICATIONS

DATA BASE ADMINISTRATION

1.Data Base Administration will install all new versions/releases of database software support products. Testing of these new versions/releases will be done according to the following arrangement:

§General maintenance may be applied and tested in the development environment, with no formal testing script being prepared or followed. If desired or recommended, Data Base Administration may request help from Data Base Management to either test applications in the system, or to arrange with Applications a type or string of applications to test the changes.

§General maintenance may be applied and tested in the development environment, **with a formal testing script** being prepared or followed. Data Base Administration will request help from Data Base Management to either test applications in the system, or to arrange with Applications a type or string of applications to test the changes.

§Data Base Administration will determine when fixes, versions, or releases will be promoted to the production environment. This decision will be conveyed to the organization through the Change Management process.

§Data Base Administration will ensure that Data Base Management and Application Development either are provided or are informed of the latest release or version numbers of manuals needed to support the system changes.

2.Data Base Administration will execute all "Grants" as outlined above.

3.Data Base Administration will install all new versions/release of database systems support software. If desired or recommended, Data Base Administration may request help from Data Base Management to test those applications.

4.Data Base Administration will monitor and maintain all data base systems environments.

5.Data Base Administration will create and maintain its own set of policies, standards, procedures, and guidelines for the operation of database systems support.

DATA BASE MANAGEMENT

1.Data Base Management will provide support for all data base applications development. It will be responsible for communicating database systems support requirements to the Data Base Administration staff. These requirements and notifications will include:

- New CICS transaction names
- New PSB names

- New DBD names
- New DB2 Plan names
- New program names
- All other additions or changes to the system which require prior system generation

2.Data Base Management will be responsible for:

- all binds of DB2 packages and plans.
  - §This responsibility requires RACF update capabilities on all datasets, which are designated as DB2.CONTROL and EASYCTL.
  - §creating or altering all application DB2 objects.
  - §creating and arranging DB2 storage groups.
  - §creating and placing IMS database and index data sets.
  - §The need for changes or additions in DASD will be directed to Data Base Administration. They will be responsible for the identification or securing of DASD. They will notify Data Base Management when the DASD has been identified or defined for DBM's use.

3.Data Base Management will be responsible for all IMS DBD gens and PSB gens, and the scheduling of all ACB gens.

- This responsibility requires RACF update capabilities on all data sets, which are designated as PSBLIB, DBDLIB, or ACBLIB.
  - §Data Base Management will coordinate the scheduling of PSBGEN's and/or DBDGEN's. Data Base Management will coordinate the predecessor/successor relationship between the above jobs and the ACBGEN's, and will submit the ACBGEN jobs and introduce the changed ACB library to DB/CTL as needed for CICS access.

4.Data Base Management will monitor IMS and DB2 applications programs.

5.Data Base Management will monitor IMS and DB2 applications data bases and DB2 objects for efficiencies and growth, and will make or coordinate changes to these objects as required.

- This responsibility requires RACF update capabilities on the data set VSAMCTL and other controlling data sets.

6.Data Base Management will create and maintain the policies, standards, procedures, and guidelines for the development and the execution of applications which are developed using data base system resources.

- See separate document entitled "Data Base Management, Applications Development Standards and Procedures".

7.Data Base Management will create and maintain the policies, standards, procedures, and guidelines for the development and the execution of utilities which are used to monitor and maintain application IMS and DB2 datasets.

- See separate document entitled "Data Base Management, IMS and DB2 Utilities Standards and Procedures".

Appendix A

IMSERVICES RESPONSIBILITIES	
DATA BASE MANAGEMENT	DATA BASE ADMINISTRATION
PACKADM DBADM (for Applications data bases) (With implied authorizations for DBCTRL and DBMAINT: DROP, LOAD, RECOVERDB, REOR,G REPAIR, CREATETAB, CREATETS,	Installation SYSOPR Installation SYSADM (A secondary authorization id - Used for system install, maintenance, and emergency) SYSOPR DBADM (for system support data bases)

DISPLAYDB, IMAGCOPY, STARTDB, STOPDB, STATS)	
Privileges and Authorities from SYSCTRL	
BINDADD BINDAGENT CREATALIAS CREATEDBA CREATEDBC CREATESG STOSPACE Privileges on all tables: ALTER INDEX Privileges on all plans: BIND Privileges on all packages: BIND COPY Privileges on all collections: CREATE IN	BINDADD BSDS MONITOR1 MONITOR2
Privileges on catalogue tables: SELECT UPDATE Use Privileges on: BUFFERPOOL STOGROUP TABLESPACE	