

- COURSE CODE:** DZOSPT
- COURSE TITLE:** Subsystem Performance & Tuning
- AUDIENCE:** Database Administrators, System Administrators and Capacity Planners.
- PREREQUISITES:** A working knowledge of DB2 objects and architecture.
- DURATION:** 4 days (non-data sharing)  
5 days (including data sharing)
- SUMMARY:** This course places particular emphasis on the monitoring, performance and tuning of the DB2 UDB for z/OS subsystem. This includes:
- The DB2 workload assessment
  - Response times and throughput
  - Buffers, EDM, RID and Sort pools
  - Threads
  - Data set placement/management
  - Locking & concurrency
  - IRLM
  - Logging
  - Database Services Address Space (DBM1) optimisation
  - CICS considerations
  - Data sharing considerations (5<sup>th</sup> day – optional)
- Central to tuning the above-listed facilities are the accounting and statistics reports and DB2 commands (e.g., -DISPLAY BUFFER/THREAD).
- OBJECTIVES:** Upon completion of this presentation, the participant should be able to:
- Plan for performance tuning
  - Determine which tools to use
  - Measure system performance
  - Determine if subsystem will be cost-effective
  - Determine the cause of performance problems
  - Decide when and what to tune
  - Interpret relevant accounting and statistics reports
  - Tune DB2 subsystem facilities
- LAB:** Numerous exercises involving accounting reports, statistics reports and command displays.

### 1. DB2 OBJECTS – REVIEW

- Storage groups
- Databases
- Table spaces
- Tables
- Indexes
- Views
- Aliases vs. synonyms
- DB2 limits

### 2. 64-BIT ADDRESSING CONSIDERATIONS

- The architecture
- Above-the-bar vs. above-the-line
- Buffer pool
- Sort pool
- Cast-out buffer
- Compression dictionaries

### 3. GETTING ORGANISED FOR PERFORMANCE & TUNING

- What is performance?
- How to set performance goals
- What may cause performance problems?

### 4. ZPARAMs

- High performance parameters
- Medium performance parameters
- Low performance parameters

### 5. MONITORING TOOLS – OPTIONS

### 6. TRACES

- Starting
- Stopping
- Types (e.g., accounting, statistics)
- Scope
- Class types
- Output destination

### 7. RESPONSE TIMES

- Classes (e.g., Class 1, Class 2, Class 3)
- In application
- In DB2
- Suspensions (e.g., Class 3, Class 8)

### 8. WORKLOAD CONSIDERATIONS

- Definitions
- DB2 thread management
- CICS thread management
- Thread response times
- System parameter report
- DSNZPARM workload control
- Thread queuing reports
- Workshop

### 9. OPERATING SYSTEM FACTORS

- Tasks -- DB2 vs. Application process
- TSBs vs. SRBs
- Dispatching priorities (address spaces – MSTR, DBM1, DIST, SPAS & IRLM)
- Real vs. virtual storage management
- DSMAX Considerations
- Workshop

### 10. BUFFER POOL TUNING

- Virtual pools
- Data spaces
- Buffer stealing algorithms
- Workshop

### 11. VIRTUAL BUFFER POOL THRESHOLDS

- Data set deferred write (VDWQT)
- Deferred write (DWQT)
- Virtual pool sequential steal (VPSEQT)
- Virtual pool assisting parallel sequential (VPXPSEQT)
- Virtual pool parallel sequential steal (VPPSEQT)
- Sequential prefetch (SPTH)
- Data manager (DMTH)
- Immediate write (IWTH)
- Monitoring – statistics, accounting & commands
- How to monitor and tune
- Workshop

### 12. EDM POOL TUNING

- Usage
- Sizing
- I/O activity
- How to monitor and tune
- Workshop

### 13. TUNING SORTS

- What causes sorts?
- Clustered vs. non-clustered indexes
- Role of DSNDBO7 (workfile)
- How to monitor and tune
- Workshop

### 14. I/O TUNING

- Synchronous I/O
- Asynchronous I/O
- Prefetch (sequential & dynamic)
- List prefetch
- CP vs. Sysplex parallelism
- Read engines vs. write engines
- I/O scheduling priority
- Workshop

### 15. TUNING THE LOG FUNCTION

- What is logged?
- When does logging take place?
- Relevant ZPARMs
- Active log
- Archive log
- BSDS
- DB2 Directory
- Two-phase commit
- How to tune
- Workshop

### 16. LOCKING & CONCURRENCY TUNING

- Transaction locks
- Lockable objects
- Claims and drains
- Latches
- Bind option
- Application considerations
- How to monitor (e.g., -DISPLAY DATABASE LOCKS, -DISPLAY THREAD, statistics of accounting reports)
- How to tune
- Workshop

### 17. CONTROLLING THREADS

- CICS factors
- IMS factors
- CICS – DB2CONN, DB2ENTRY & DB2TRAN
- CICS open TCBs



### **18. DATABASE SERVICES (DBM1) ADDRESS SPACE MONITORING & TUNING**

- 31-bit addressing limit
- Structure and contents (e.g., VP, EDM pool, threads)
- IFCIDs
- Storage usage statistics report
- Major storage consumer (e.g., VP)
- Storage manager pools
- Tuning options

### **OPTIONAL 5<sup>TH</sup> DAY TOPICS:**

#### **19. DATA SHARING MONITORING & TUNING – DBA PERSPECTIVE**

- Parallelism
- Response times
- Locking and concurrency
- Accounting and statistics traces
- DB design
- ZPARM values
- Logs and BSDS
- Workfiles
- BIND/REBIND options
- DDL (LOCKSIZE, MAX ROWS, etc.)

#### **20. DATA SHARING MONITORING & TUNING – DEVELOPER PERSPECTIVE**

- Locking
- Lock avoidance
- Commit frequency
- Batch vs. online considerations
- Programming guidelines