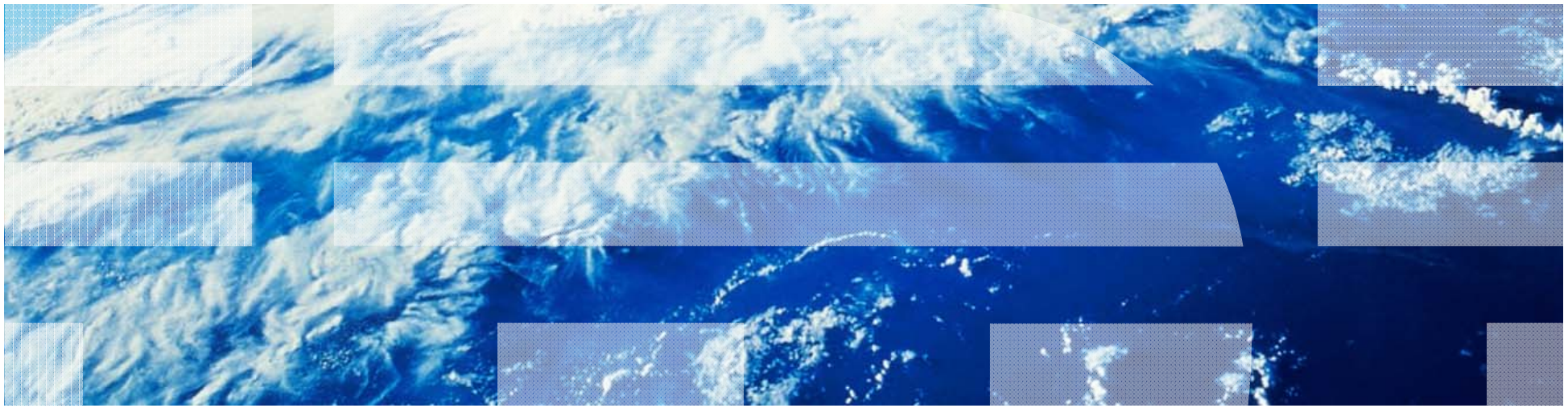
IBM

Information Management

Performance Analysis Tools

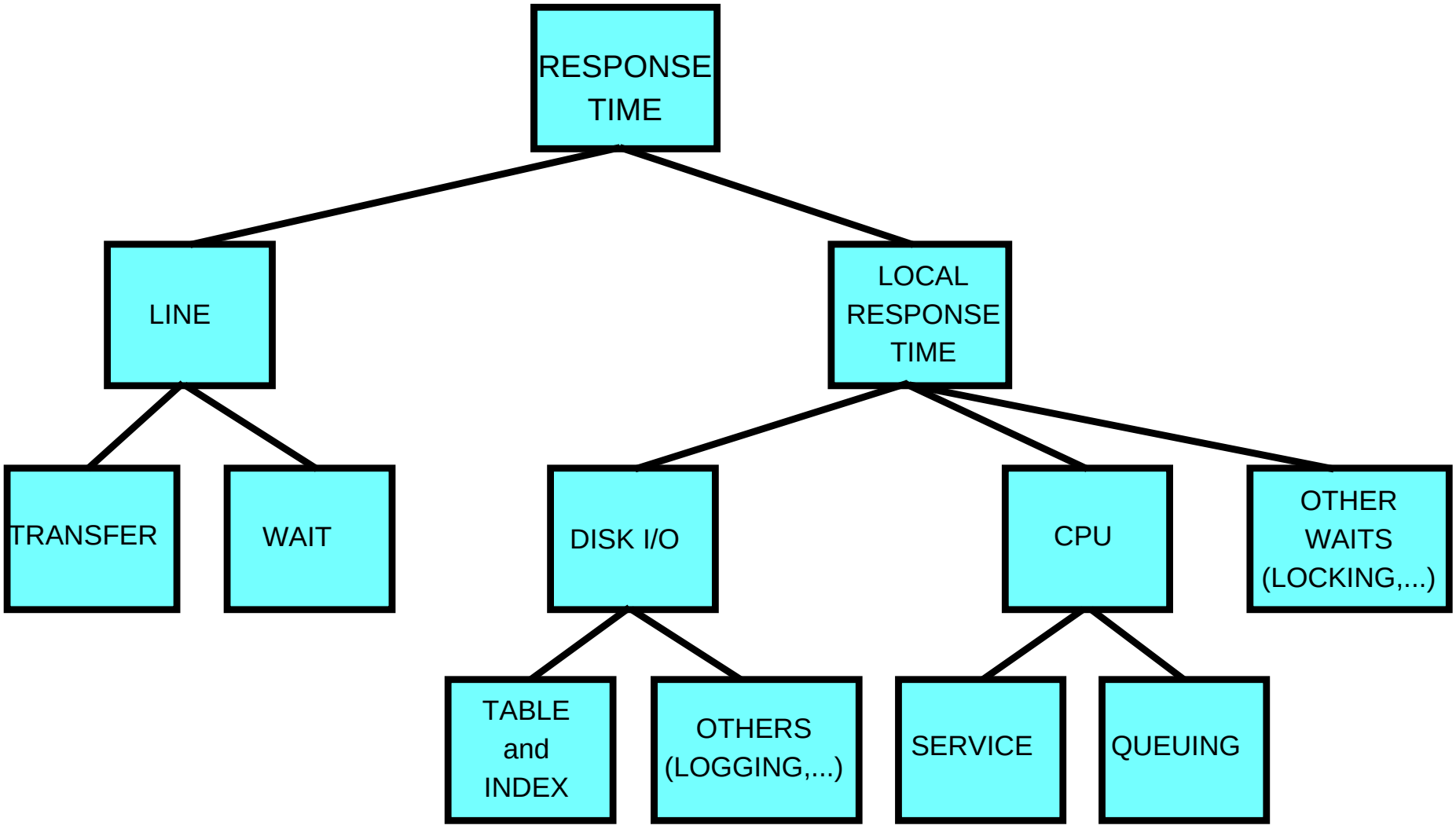


Unit objectives

After completing this unit, you should be able to:

- Understand components of local response time (LRT)
- Identify touch random (TR), touch sequential (TS), and fetch (F) time costs
- Utilize VQUBE3 to estimate local response time (LRT)
- Locate necessary time values in an accounting trace report
- Draw and interpret a bubble chart

Components of response time



Methodology formulas

- **Formula 1:**

  LRT = TR x 0.2 ms + TS x 0.003 ms + F x 0.003ms

Formula 2:

LRT = TR x 6 ms + TS x 0.003ms + F x 0.003ms

In both formulas:

- LRT = Local Response Time
- TR = Touch Random (to index or table)
- TS = Touch Sequential (to index or table)
- F = Fetch (processing of qualifying fetches)
- ms = millisecond (1/1000 of a second)
- LRT/1000 = time in seconds

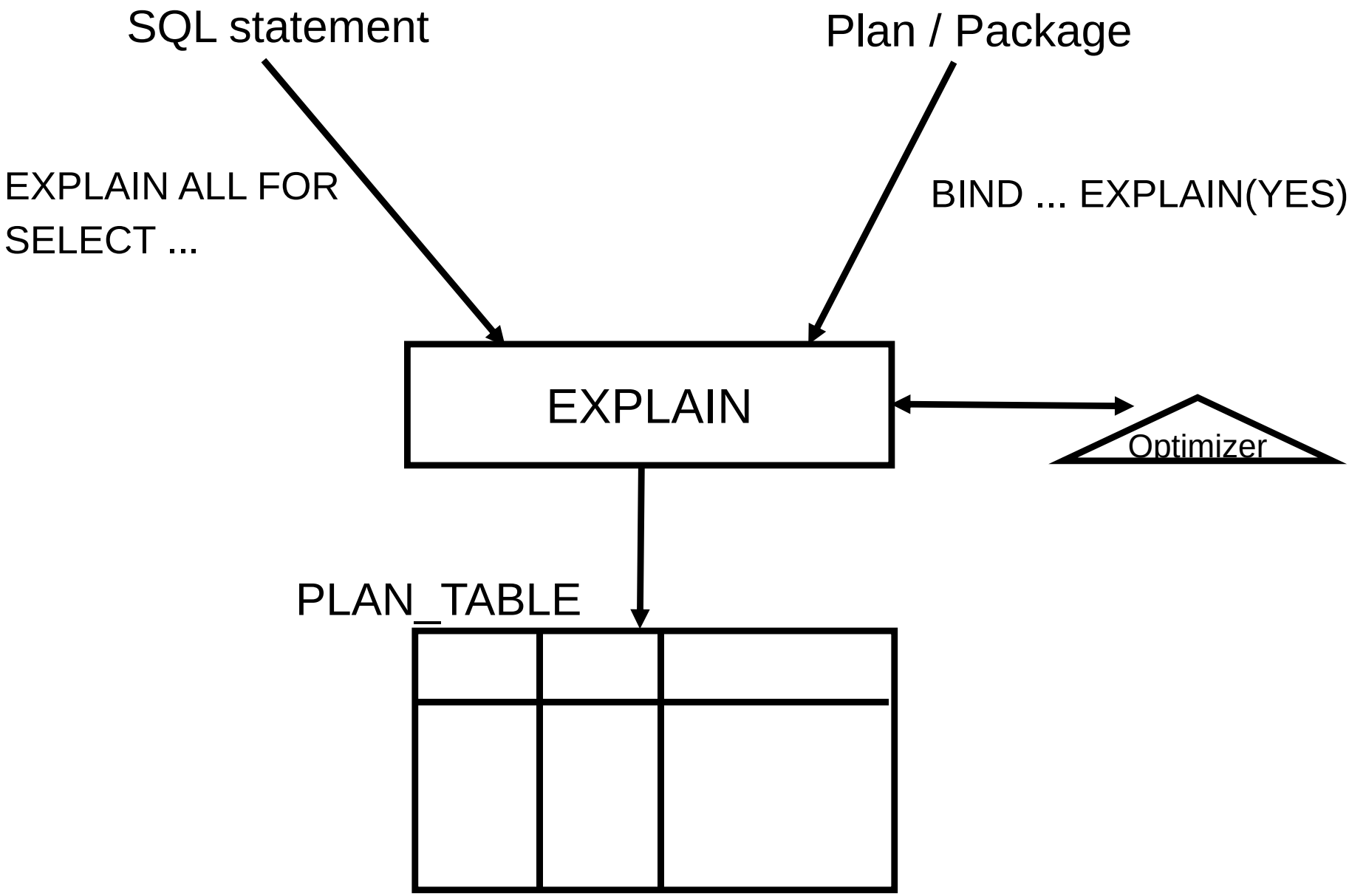
VQUBE3

	MC	INDEX		TABLE		FETCHES	LRT LG	LRT SM
		TR	TS	TR	TS			

Simple example in VQUBE3

	MC	INDEX		TABLE		FETCHES	LRT LG	LRT SM
		TR	TS	TR	TS			
X3 (original)	1	1	1,000,000	1,000,000	0	2	203 s	6,003 s
X3 (modified)	2	1	2	0	0	2	0.212 ms	6.012 ms

SQL EXPLAIN



The plan table

Columns in PLAN_TABLE:

- QUERYNO
- ACCESSTYPE
- MATCHCOLS
- ACCESSNAME
- INDEXONLY
- SORTx_UNIQ
- SORTx_ORDERBY
- SORTx_GROUPBY
- PREFETCH

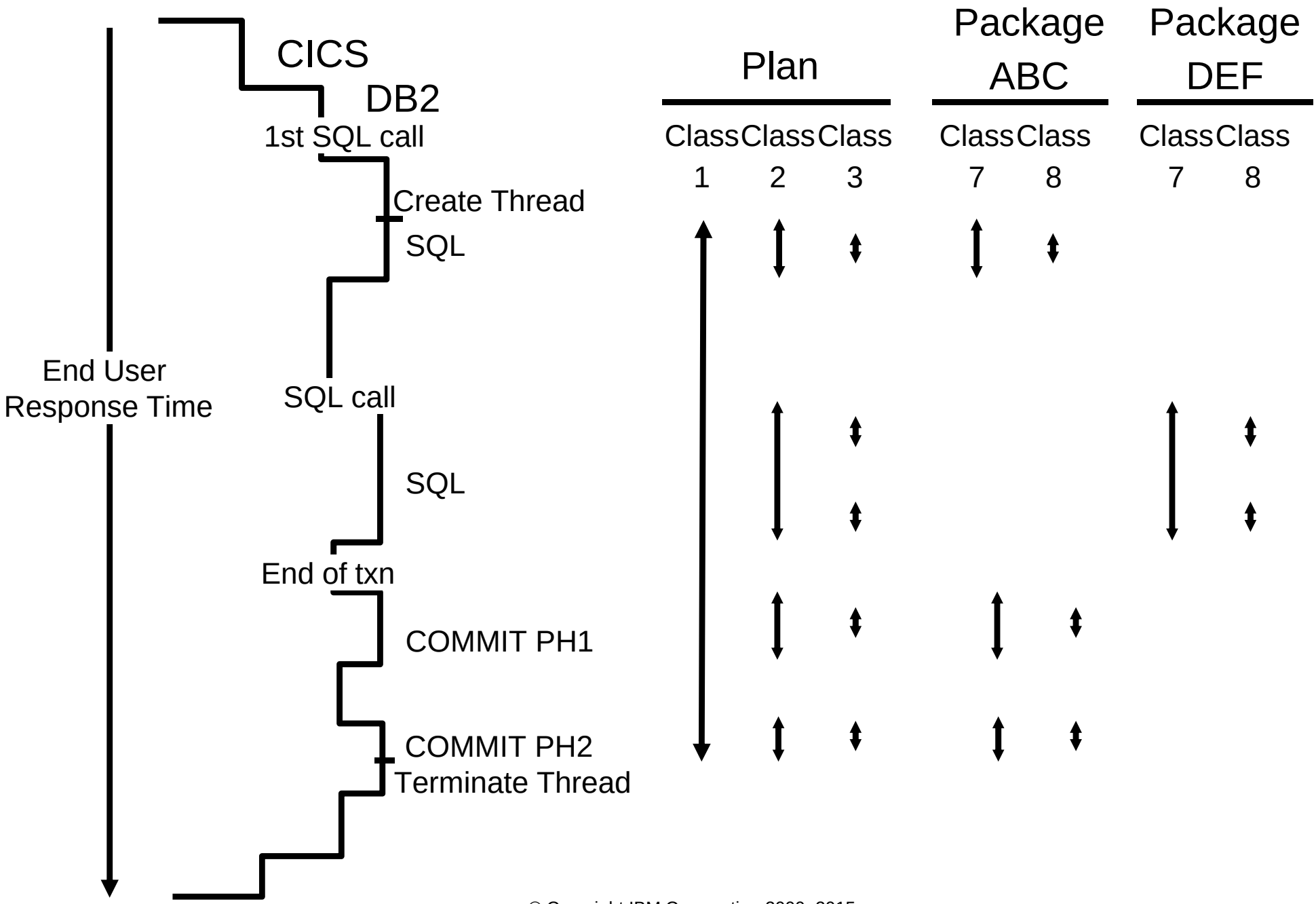
Running the EXPLAIN

```
EXPLAIN ALL SET QUERYNO = 1 FOR
SELECT LNAME, CUSTNO
FROM CUST
WHERE FNAME = :FNAME
AND
CITY = :CITY
ORDER BY LNAME
OPTIMIZE FOR 20 ROWS ;
```

Interpreting the results

QUERYNO	ACCESSTYPE	MATCHCOLS	ACCESSNAME	INDEXONLY
1	I	2	X3	Y

The accounting trace



Reading an accounting trace report

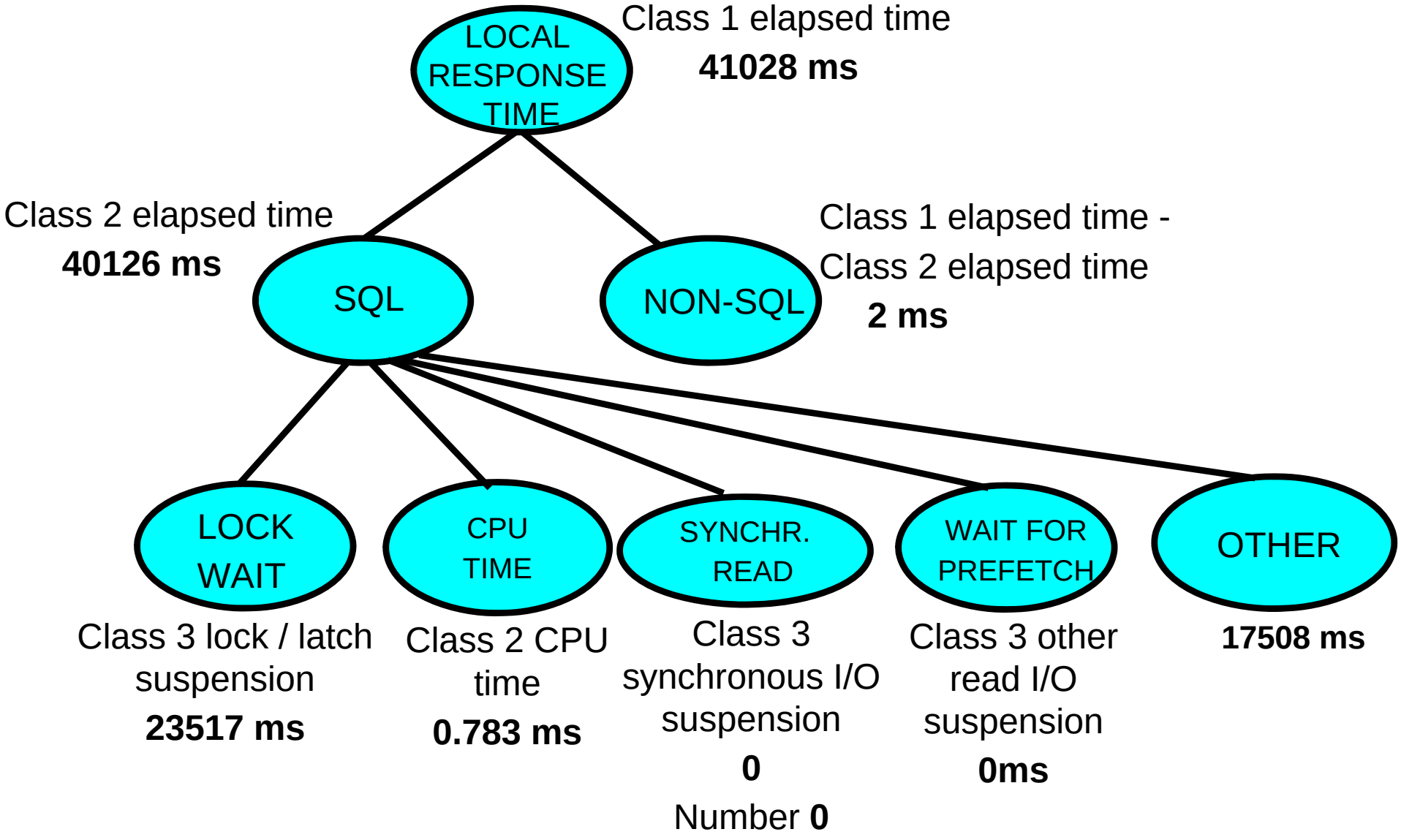
```
1   LOCATION: OMPDB51                OMEGAMON XE FOR DB2 PERFORMANCE EXPERT (V5R3M0)                    PAGE: 1-1
       GROUP: N/P                                ACCOUNTING REPORT - LONG                  REQUESTED FROM: NOT SPECIFIED
      MEMBER: N/P                                                                                       TO: NOT SPECIFIED
   SUBSYSTEM: DB51                             ORDER: PRIMAUTH-PLANNAME                    INTERVAL FROM: 04/04/13 16:18:54.20
DB2 VERSION: V11                                   SCOPE: MEMBER                                        TO: 04/04/13 16:20:39.21

PRIMAUTH: DNSK  PLANNAME: DB2WORK1

ELAPSED TIME DISTRIBUTION                                                CLASS 2 TIME DISTRIBUTION
-------------------------------------------------------------------      ------------------------------------------------------------------
APPL   |                                                                 CPU    |
DB2    |                                                                 SECPU  |
SUSP   |================================================> 100%          NOTACC |
                                                                         SUSP   |================================================> 100%

AVERAGE       APPL(CL.1)  DB2 (CL.2)    CLASS 3 SUSPENSIONS   AVERAGE TIME  AV.EVENT  TIME/EVENT    HIGHLIGHTS
------------  ----------  ----------    --------------------  ------------  --------  ----------    --------------------------
ELAPSED TIME   41.028498   41.026407    LOCK/LATCH(DB2+IRLM)     23.517874      1.00   23.517874    #OCCURRENCES    :        2
 NONNESTED     23.527394   23.525304     IRLM LOCK+LATCH         23.517874      1.00   23.517874    #ALLIEDS        :        2
 STORED PROC   17.501104   17.501104     DB2 LATCH                0.000000      0.00         N/C    #ALLIEDS DISTRIB:        0
 UDF            0.000000    0.000000    SYNCHRON. I/O            0.000000      0.00         N/C    #DBATS          :        0
 TRIGGER        0.000000    0.000000     DATABASE I/O            0.000000      0.00         N/C    #DBATS DISTRIB. :        0
                                         LOG WRITE I/O           0.000000      0.00         N/C    #NO PROGRAM DATA:        0
CP CPU TIME     0.001161    0.000783    OTHER READ I/O           0.000000      0.00         N/C    #NORMAL TERMINAT:        2
 AGENT          0.001161    0.000783    OTHER WRTE I/O           0.000000      0.00         N/C    #DDFRRSAF ROLLUP:        0
  NONNESTED     0.001141    0.000763    SER.TASK SWTCH           0.002215      2.50    0.000886    #ABNORMAL TERMIN:        0
  STORED PRC    0.000020    0.000020     UPDATE COMMIT           0.000821      1.00    0.000821    #CP/X PARALLEL. :        0
  UDF           0.000000    0.000000     OPEN/CLOSE              0.000000      0.00         N/C    #UTIL PARALLEL. :        0
  TRIGGER       0.000000    0.000000     SYSLGRNG REC            0.000000      0.00         N/C    #IO PARALLELISM :        0
 PAR.TASKS      0.000000    0.000000     EXT/DEL/DEF             0.000000      0.00         N/C    #PCA RUP COUNT  :        0
                                         OTHER SERVICE           0.001395      1.50    0.000930    #RUP AUTONOM. PR:        1
SE CPU TIME     0.000000    0.000000    ARC.LOG(QUIES)           0.000000      0.00         N/C    #AUTONOMOUS PR  :        1
 NONNESTED      0.000000    0.000000    LOG READ                 0.000000      0.00         N/C    #INCREMENT. BIND:        0
 STORED PROC    0.000000    0.000000    DRAIN LOCK               0.000000      0.00         N/C    #COMMITS        :        0
 UDF            0.000000    0.000000    CLAIM RELEASE            0.000000      0.00         N/C    #ROLLBACKS      :        2
 TRIGGER        0.000000    0.000000    PAGE LATCH               0.000000      0.00         N/C    #SVPT REQUESTS  :        0
                                        NOTIFY MSGS              0.000000      0.00         N/C    #SVPT RELEASE   :        0
 PAR.TASKS      0.000000    0.000000    GLOBAL CONTENTION        0.000000      0.00         N/C    #SVPT ROLLBACK  :        0
                                        COMMIT PH1 WRITE I/O     0.000000      0.00         N/C    MAX SQL CASC LVL:        1
SUSPEND TIME    0.000000   41.021101    ASYNCH CF REQUESTS       0.000000      0.00         N/C    UPDATE/COMMIT   :     1.50
 AGENT              N/A   41.021101    TCP/IP LOB XML           0.000000      0.00         N/C    SYNCH I/O AVG.  :      N/C
 PAR.TASKS          N/A    0.000000    ACCELERATOR              0.000000      0.00         N/C
 STORED PROC    0.000000         N/A    AUTONOMOUS PROCEDURE    17.501012      0.50   35.002024
 UDF            0.000000         N/A    PQ SYNCHRONIZATION       0.000000      0.00         N/C
                                        TOTAL CLASS 3           41.021101      4.00   10.255275
NOT ACCOUNT.        N/A    0.004524
DB2 ENT/EXIT        N/A        7.00
EN/EX-STPROC        N/A        0.00
EN/EX-UDF           N/A        0.00
DCAPT.DESCR.        N/A         N/A
LOG EXTRACT.        N/A         N/A
```

The bubble chart

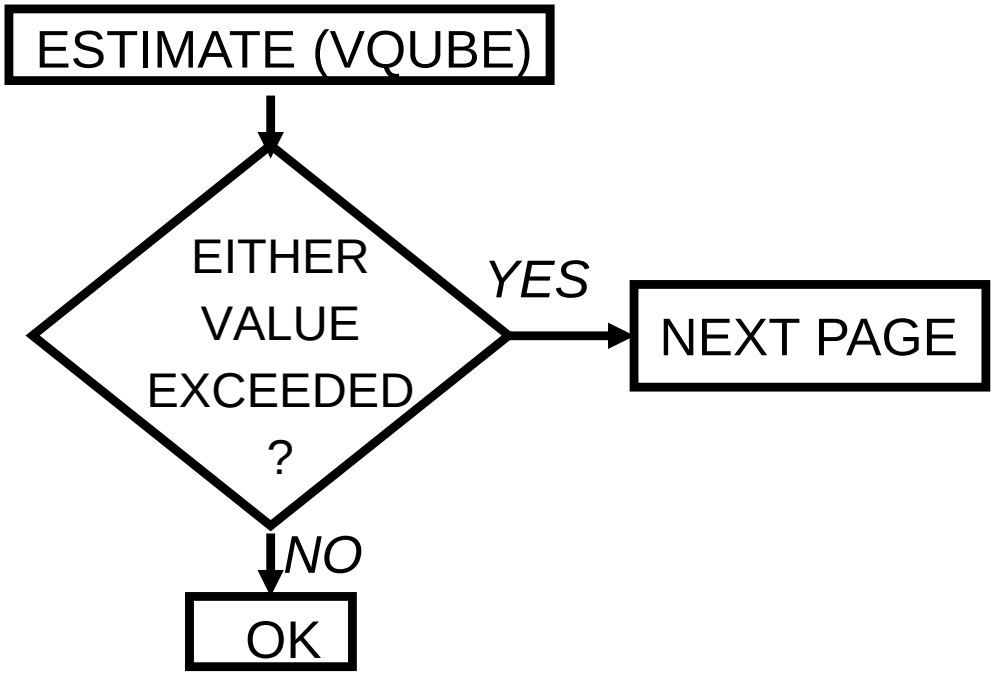


Monitoring execution

- VQUBE3 = Local response time
  - Formulas estimate LRT
- Accounting Trace = Execution data
  - Trace of actual execution times
- Bubble Chart = Summarize components of execution time
  - Visual representation of accounting information

Performance thresholds

BATCH	Commit interval: **5s**
Data warehouse queries	
Operational transactions	Local response time
Average input	**0.5s**
Worst input	**5s**



Tuning potential

- If LRT exceeds the limit:
  - Here are just some of the things to investigate
  - All of these, and more, are covered in this course
  - **Improve indexing**
    - Use the appropriate type of index
    - Optimize the number of matching columns
    - Check whether any sorts can be avoided
    - Check for index-only access
  - **Improve SQL statements**
    - Check for non-indexable predicates
    - Check for non-Boolean term predicates
    - Check the type of any subquery
  - **Denormalize tables**
    - A performance tradeoff
    - With triggers, denormalizing tables no longer poses an integrity risk
  - **Reduce lock durations**
    - Check duration of commit interval
    - Check isolation level
    - Check for lock avoidance
  - **Negotiate with users**
    - Users may accept a different output sequence or drop a total field when they see the difference in response time.

Unit summary

Having completed this unit, you should be able to:

- Understand components of local response time (LRT)
- Identify touch random (TR), touch sequential (TS), and fetch (F) time costs
- Utilize VQUBE3 to estimate local response time (LRT)
- Locate necessary time values in an accounting trace report
- Draw and interpret a bubble chart