

ICS 421 Spring 2010
Performance Tuning

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Performance Tuning

Given

- a **database**
 - Tables (schema etc)
 - Data
- a **workload**
 - Queries and their frequency
 - Updates and their frequency
- DBMS **software** running on some **hardware**

What knobs can you play with to improve performance ?

Knobs & Factors

Knobs

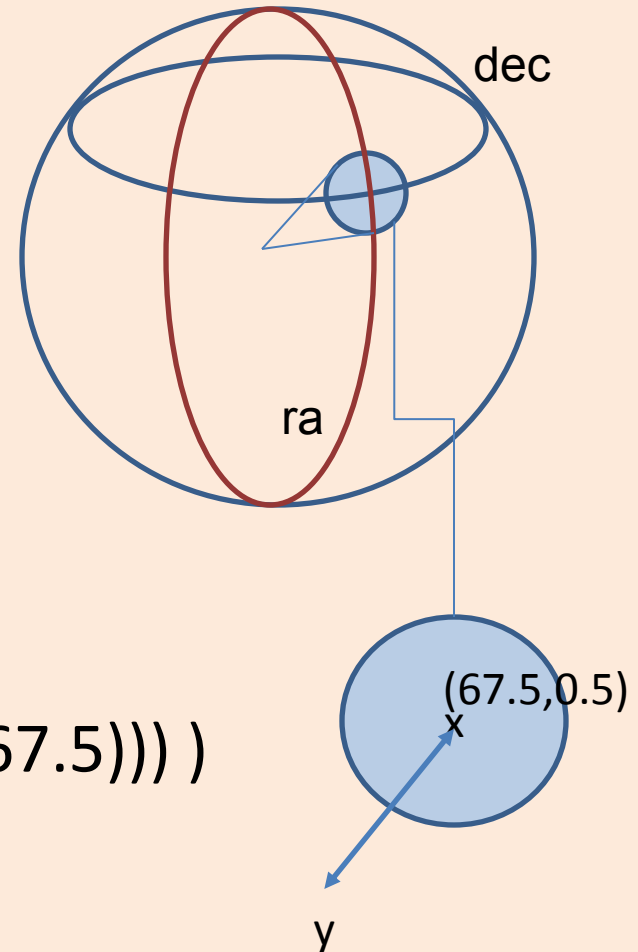
- Indexes
- Query rewriting
- Table schema
- Locking
- Logging
- Hardware
- Memory

Factors

- Data Size
- Budget
- Purpose
- Workload
 - Read intensive vs write intensive
 - Types of queries
 - Frequencies

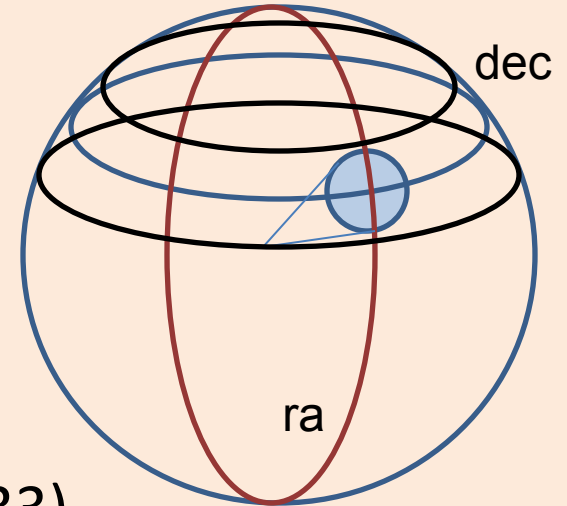
Query 100: Brute Force Cone Search

```
SELECT O.objID, O.ra, O.dec,  
        O.htmid, O.zoneid  
FROM Object O  
WHERE ( SIN(RADIANS(O.dec))  
        * SIN(RADIANS( +0.5))  
+ COS(RADIANS(O.dec))  
        * COS(RADIANS( +0.5))  
        * COS(RADIANS((O.ra) - (67.5))) )  
>= COS(RADIANS( 1.0/60.0))
```



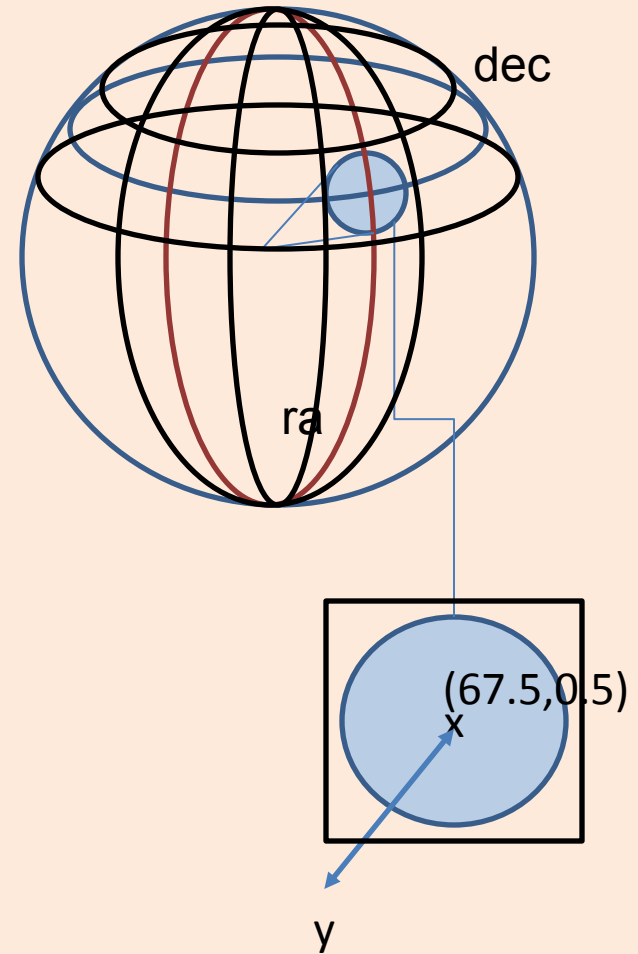
Query 101: Prefiltering using ZoneID

```
SELECT O.objID, O.ra, O.dec,  
        O.htmid, O.zoneid  
FROM Object O  
WHERE (zoneid BETWEEN  
        FLOOR((90.0 + 0.5 - ( 1.0/60.0))/0.008333)  
        AND  
        FLOOR((90.0 + 0.5 + (1.0/60.0))/0.008333))  
        AND  
        ( SIN(RADIANS(O.dec)) * SIN(RADIANS( +0.5)) +  
        COS(RADIANS(O.dec)) * COS(RADIANS( +0.5)) *  
        COS(RADIANS((O.ra) - (67.5))) ) >= COS(RADIANS( 1.0/60.0)))
```



Query 103: Prefiltering using a Pyramid

```
SELECT O.objID, O.ra, O.dec,  
        O.htmid, O.zoneid  
FROM Object O  
WHERE  
(O.ra BETWEEN ((67.5)-( 1.0/60.0)) AND  
  ((67.5)+( 1.0/60.0)))  
AND  
(O.dec BETWEEN (( +0.5)-( 1.0/60.0)) AND ((  
  +0.5)+( 1.0/60.0)))  
AND  
( SIN(RADIANS(O.dec)) * SIN(RADIANS( +0.5))  
+ COS(RADIANS(O.dec))* COS(RADIANS( +0.5))  
  * COS(RADIANS((O.ra) - (67.5))) )  
  >= COS(RADIANS( 1.0/60.0))
```



Query 110: Join with Detection

```
SELECT O.objID, O.ra, O.dec, O.htmid, O.zoneid,  
D.detectid  
FROM Object O, Detection D  
WHERE O.objid=D.objid  
AND ( SIN(RADIANS(O.dec)) * SIN(RADIANS(  
+0.5))  
+ COS(RADIANS(O.dec)) * COS(RADIANS( +0.5))  
* COS(RADIANS((O.ra) - (67.5))) ) >=  
COS(RADIANS( 1.0/60.0))
```

Schema for Object & Detection

CREATE TABLE Object (

objID BIGINT,
htmlID BIGINT,
zoneID INT,
ra DOUBLE,
dec DOUBLE,
cx DOUBLE,
cy DOUBLE,
cz DOUBLE,
lambda FLOAT,
beta FLOAT,
l FLOAT,
b FLOAT,
lsg FLOAT,
bsg FLOAT,

gMagBest
REAL,
rMagBest
REAL,
iMagBest REAL,
zMagBest
REAL,
yMagBest
REAL,
grColor REAL,
riColor REAL,
izColor REAL,
zyColor REAL,
sgSep REAL)

CREATE TABLE Detection (

objID BIGINT,
detectID BIGINT,
filterID SMALLINT,
imageID BIGINT,
obsTime FLOAT,
raObs FLOAT,
decObs FLOAT,
mag REAL,
sky REAL,
sgSep REAL);

Horizontal Decomposition

```
CREATE TABLE DETECTION201001(...)
```

```
CREATE TABLE DETECTION201002(...)
```

```
CREATE TABLE DETECTION201003(...)
```

```
ALTER TABLE DETECT201001 ADD CONSTRAINT CHK_JAN  
  CHECK (MONTH(obsTime) =1);
```

```
...
```

```
INSERT INTO ...
```

```
...
```

```
CREATE VIEW DETECTION AS  
  SELECT * FROM DETECTION201001  
  UNION ALL  
  SELECT * FROM DETECTION201002  
  UNION ALL  
  SELECT * FROM DETECTION201003
```

Performance Tuning Tools

- Explain
- Not getting the right plans ? runstats
- Twisting the arm of the optimizer using selectivity clause
- Event Monitors
- Other smart tools
 - Index advisors
 - Schema advisors
 - Query patroller