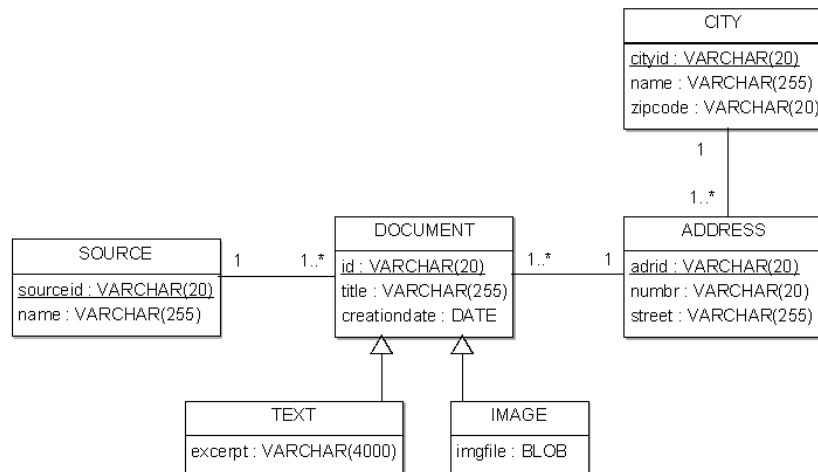


Duration: 1 hour – Documents allowed

Consider the cultural heritage datamart<sup>1</sup> conceptually represented below as a UML class diagram.



1. Translate this conceptual model into a physical Oracle model (types and object tables).
2. With an SQL query, compute the cube displaying the number of textual documents, per street and per year of creation.
3. With another SQL query, rollup to the number of textual documents, per city (name) and per year of creation.

<sup>1</sup> Excerpt from the TECTONIQ research project.

-- SOLUTION

```

CREATE TYPE t_source AS OBJECT(
  sourceid VARCHAR(20),
  name VARCHAR(255)
)
/

CREATE TYPE t_city AS OBJECT(
  cityid VARCHAR(20),
  name VARCHAR(255),
  zipcode VARCHAR(20)
)
/

CREATE TYPE t_address AS OBJECT(
  adrid VARCHAR(20),
  numbr VARCHAR(20),
  street VARCHAR(255),
  cityref REF t_city
)
/

CREATE TYPE t_document AS OBJECT (
  docid VARCHAR(20),
  title VARCHAR(255),
  creationdate DATE,
  sourceref REF t_source,
  addrref REF t_address
) NOT FINAL
/

CREATE TYPE t_text UNDER t_document(
  excerpt VARCHAR(4000)
)
/

CREATE TYPE t_image UNDER t_document(
  imgfile BLOB
)
/

CREATE TABLE source OF t_source(
  CONSTRAINT sourcepk PRIMARY KEY(sourceid)
);

CREATE TABLE city OF t_city(
  CONSTRAINT citypk PRIMARY KEY(cityid)
);

CREATE TABLE address OF t_address(
  CONSTRAINT adrpk PRIMARY KEY(adrid),
  CONSTRAINT adrcity cityref REFERENCES city
);

CREATE TABLE document of t_document(
  CONSTRAINT docpk PRIMARY KEY(docid),
  CONSTRAINT docsourc source ref REFERENCES source,
  CONSTRAINT docadr addrref REFERENCES address
);
  
```

```
SELECT DECODE(GROUPING(d.addrref.street), 1, 'ALL', d.addrref.street) street,
       DECODE(GROUPING(TO_CHAR(creationdate, 'YYYY')), 1, 'ALL',
              TO_CHAR(creationdate, 'YYYY')) year,
       COUNT(*) nbtexts
FROM document d
WHERE VALUE(d) IS OF(t_text)
GROUP BY CUBE(d.addrref.street, TO_CHAR(creationdate, 'YYYY'));

SELECT DECODE(GROUPING(d.addrref.cityref.name), 1, 'ALL',
              d.addrref.cityref.name) city,
       DECODE(GROUPING(TO_CHAR(creationdate, 'YYYY')), 1, 'ALL',
              TO_CHAR(creationdate, 'YYYY')) year,
       COUNT(*) nbtexts
FROM document d
WHERE VALUE(d) IS OF(t_text)
GROUP BY CUBE(d.addrref.cityref.name, TO_CHAR(creationdate, 'YYYY'));
```