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ESCUELA DE INGENIERÍA
DEPARTAMENTO DE CIENCIA DE LA COMPUTACIÓN
IIC2413 – Bases de Datos, II Semestre 2020
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Entrega 2

1. Diagrama E/R

En la Figura 1 se presenta el Diagrama E/R diseñado para el problema.

2. Esquema relacional

A continuación se muestra el esquema relacional del diagrama expuesto anteriormente.

- ports (pid integer, name character varying(100), cid integer)
- cities (cid integer, name character varying(100), region character varying(100))
- facilities (fid integer, type character varying(50), rut character varying(50), pid integer, capacity integer)
- facility_history_entries (fheid integer, fid integer, closed_on timestamp without time zone, opened_on timestamp without time zone, close_boss_rut character varying(50))
- employees (rut character varying(50), name character varying(100), age integer, sex character varying(50), fid integer)
- ships (license_plate character varying(50), name character varying(100), country character varying(100))
- shipyard_permits (spid integer, fid integer, license_plate character varying(50), arrival_date timestamp without time zone, departure_date timestamp without time zone)
- dock_permits (dpid integer, fid integer, license_plate character varying(50), arrival_date timestamp without time zone, description character varying(400))

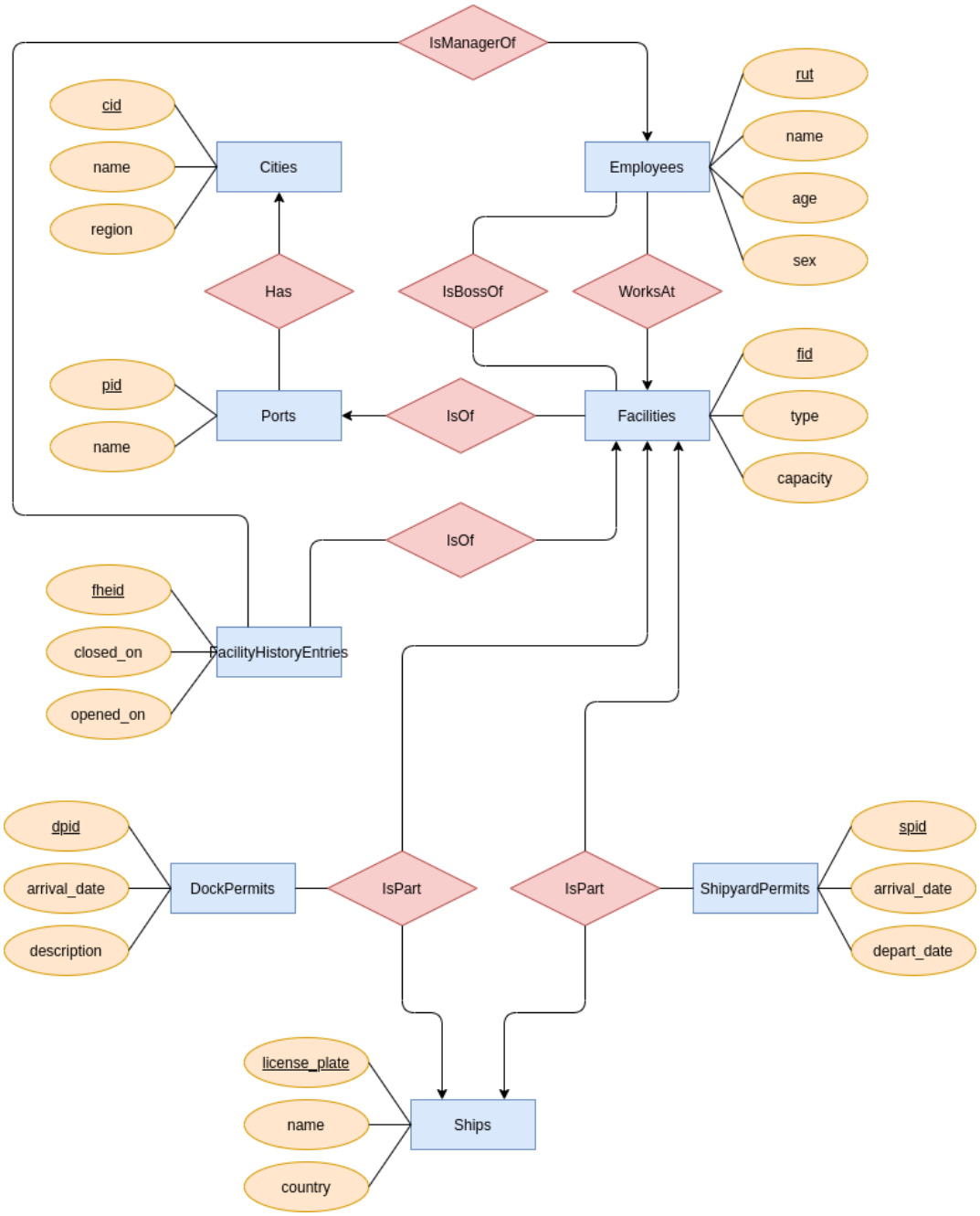

Figura 1: Diagrama E/R

3. Justificación del modelo

El modelo se diseñó para cumplir con las restricciones de 3NF. A continuación se muestran las dependencias funcionales para cada tabla en la base de datos:

- ports (pid, name, cid)
  - pid $\rightarrow$ name, cid
- cities (cid, name, region)
  - cid $\rightarrow$ name, region
- facilities (fid, type, rut, pid, capacity)
  - fid $\rightarrow$ type, rut, pid, capacity
- facility_history_entries (fheid, fid, closed_on, opened_on, close_boss_rut)
  - fheid $\rightarrow$ fid, closed_on, opened_on, close_boss_rut
- employees (rut, name, age, sex, fid)
  - rut $\rightarrow$ name, age, sex, fid
- ships (license_plate, name, country)
  - license_plate $\rightarrow$ name, country
- shipyard_permits (spid, fid, license_plate, arrival_date, departure_date)
  - spid $\rightarrow$ fid, license_plate, arrival_date, departure_date
- dock_permits (dpid, fid, license_plate, arrival_date, description)
  - dpid $\rightarrow$ fid, license_plate, arrival_date, description

Como se puede ver que el modelo propuesto no presenta anomlías. Se cumple que para cada tabla R_i en el modelo se da que *para toda dependencia funcional no trivial $X \rightarrow Y$, X es llave*. Por lo tanto, el modelo está en BCNF y por consecuencia está también en 3NF.

4. Consultas SQL

A continuación se incluyen las consultas SQL implementadas en la página web:

1. Muestre todos los puertos junto la ciudad a la que son asignados.

   ```
   SELECT name, cid
   FROM ports ;
   ```

2. Muestre todos los jefes de las instalaciones del puerto con nombre 'Mejillones'.

   ```
   SELECT facilities.boss_rut
   FROM (SELECT pid FROM ports WHERE UPPER(name) LIKE " %MEJILLONES %")
   AS puertos, facilities WHERE puertos.pid = facilities.pid;
   ```

3. Muestre todos los puertos que tienen al menos un astillero.

   ```
   SELECT DISTINCT pid
   FROM facilities
   WHERE UPPER(type) LIKE " %SHIPYARD %";
   ```

4. Muestre todas las veces en que el barco 'Calypso' ha atracado en 'Arica'.

   ```
   SELECT atraques.arrival_date
   FROM (SELECT facilities.fid FROM (SELECT ports.pid FROM cities, ports
   WHERE UPPER(cities.name) LIKE " %ARICA %" AND cities.cid = ports.cid)
   AS puertos, facilities WHERE puertos.pid = facilities.pid) AS instalaciones, (SE-
   LECT arrival_date, fid FROM shipyard_permits, ships WHERE UPPER(ships.na-
   me) LIKE " %CALYPSO %" UNION SELECT arrival_date, fid FROM dock_per-
   mits, ships WHERE UPPER(ships.name) LIKE " %CALYPSO %") AS atraques
   WHERE atraques.fid = instalaciones.fid;
   ```

5. Muestre la edad promedio de los trabajadores de cada puerto.

   ```
   SELECT puertos.pid, AVG(employees.age)
   FROM (SELECT ports.pid, facilities.fid FROM ports, facilities WHERE ports.pid
   = facilities.pid) AS puertos, employees
   WHERE puertos.fid = employees.fid
   GROUP BY puertos.pid;
   ```

6. Muestre el puerto que ha recibido más barcos en Agosto del 2020.

   ```
   SELECT pid
   FROM (SELECT COUNT(*), pid FROM (SELECT f.pid, t.license_plate FROM
   facilities as f, ((SELECT license_plate, fid FROM dock_permits WHERE arri-
   val_date ≥'2020-08-01' AND arrival_date <'2020-09-01') UNION (SELECT
   license_plate, fid FROM shipyard_permits WHERE arrival_date ≥'2020-08-01'
   AND arrival_date <'2020-09-01')) as t WHERE f.fid=t.fid) AS t1 GROUP BY
   pid) as t4, (SELECT MAX(count) FROM (SELECT COUNT(*), pid FROM
   ```

```
(SELECT f.pid, t.license_plate FROM facilities as f, ((SELECT license_plate,
fid FROM dock_permits WHERE arrival_date ≥'2020-08-01' AND arrival_da-
te <'2020-09-01') UNION (SELECT license_plate, fid FROM shipyard_permits
WHERE arrival_date ≥'2020-08-01' AND arrival_date <'2020-09-01')) as t WHE-
RE f.fid=t.fid) AS t1 GROUP BY pid) AS t3) AS t5 WHERE t4.count=t5.max;
```