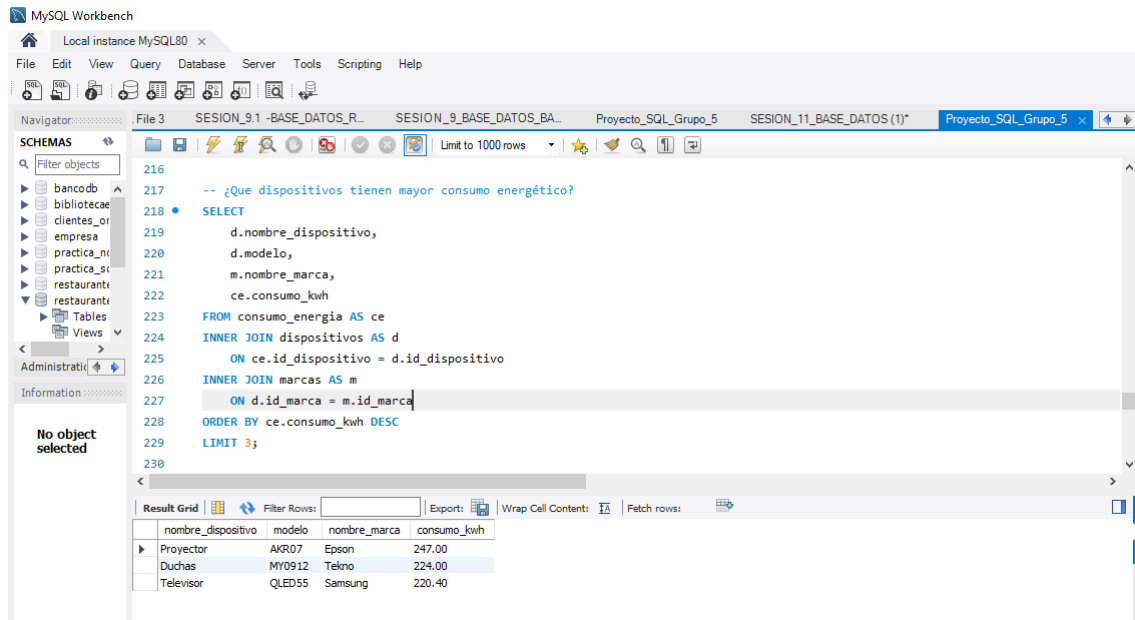


PROYECTO GRUPO#5

Análisis de Consumo de Energía en Hogares Inteligentes

Consultas De Las Preguntas De Análisis

-- ¿Qué dispositivos tienen mayor consumo energético?



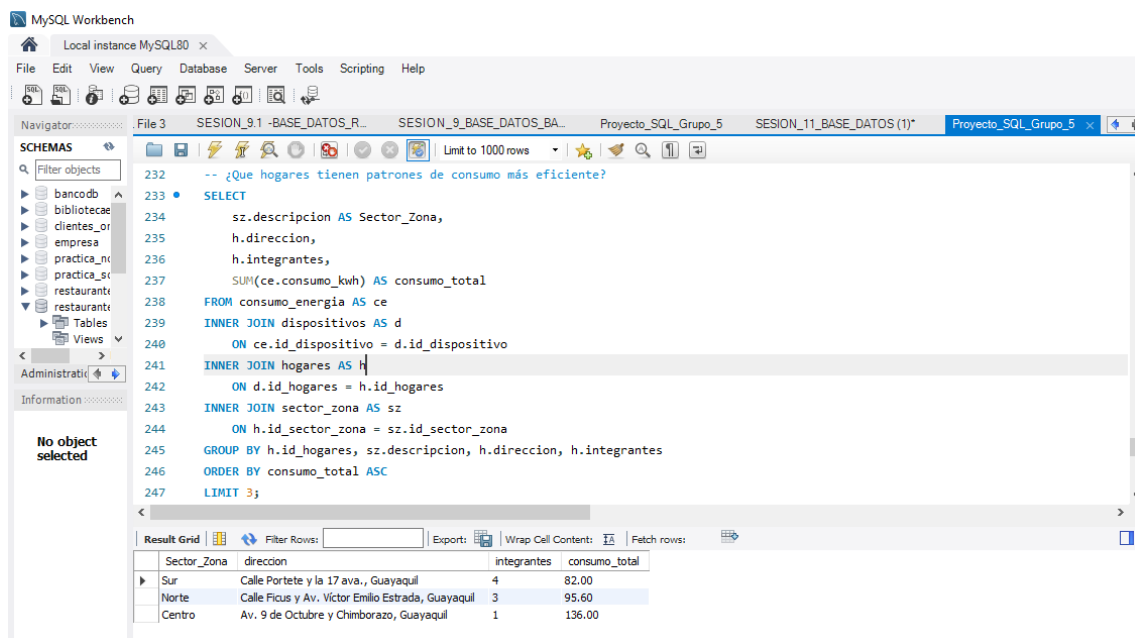
The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

```
-- ¿Que dispositivos tienen mayor consumo energético?
SELECT
  d.nombre_dispositivo,
  d.modelo,
  m.nombre_marca,
  ce.consumo_kwh
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
  ON ce.id_dispositivo = d.id_dispositivo
INNER JOIN marcas AS m
  ON d.id_marca = m.id_marca
ORDER BY ce.consumo_kwh DESC
LIMIT 3;
```

The results are displayed in the Result Grid below the query editor:

nombre_dispositivo	modelo	nombre_marca	consumo_kwh
Proyector	AKR07	Epson	247.00
Duchas	MY0912	Tekno	224.00
Televisor	QLED55	Samsung	220.40

-- ¿Qué hogares tienen patrones de consumo más eficiente?



The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

```
-- ¿Que hogares tienen patrones de consumo más eficiente?
SELECT
  sz.descripcion AS Sector_Zona,
  h.direccion,
  h.integrantes,
  SUM(ce.consumo_kwh) AS consumo_total
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
  ON ce.id_dispositivo = d.id_dispositivo
INNER JOIN hogares AS h
  ON d.id_hogares = h.id_hogares
INNER JOIN sector_zona AS sz
  ON h.id_sector_zona = sz.id_sector_zona
GROUP BY h.id_hogares, sz.descripcion, h.direccion, h.integrantes
ORDER BY consumo_total ASC
LIMIT 3;
```

The results are displayed in the Result Grid below the query editor:

Sector_Zona	direccion	integrantes	consumo_total
Sur	Calle Portete y la 17 ava., Guayaquil	4	82.00
Norte	Calle Ficus y Av. Victor Emilio Estrada, Guayaquil	3	95.60
Centro	Av. 9 de Octubre y Chimborazo, Guayaquil	1	136.00

-- ¿Qué días y horas tienen mayor consumo energético?

The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

```
-- ¿Que días y horas tienen mayor consumo energetico?
SELECT
    DATE(ce.fecha_inicio_consumo) AS dia,
    TIME(ce.fecha_inicio_consumo) AS hora,
    h.direccion AS hogar,
    sz.descripcion AS sector_zona,
    d.nombre_dispositivo,
    m.nombre_marca,
    SUM(ce.consumo_kwh) AS consumo_total,
    (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS promedio_general,
    SUM(ce.consumo_kwh) - (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS diferencia,
    ROUND(AVG(DATEDIFF(ce.fecha_fin_consumo, ce.fecha_inicio_consumo)), 0) AS dias_consumo
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
ON ce.id_dispositivo = d.id_dispositivo
```

The results grid shows the following data:

dia	hora	hogar	sector_zona	nombre_dispositivo	nombre_marca	consumo_total	promedio_general	diferencia	dias_consumo
2025-10-26	20:39:56	Av. Quito y 1ero de mayo, Guayaquil	Sur	Proyector	Epson	247.00	160.33	86.67	31
2025-05-29	04:13:48	Coop. Unión de bananeros Mz10. S.1, Guayaquil	Sur	Duchas	Telno	224.00	160.33	63.67	30
2025-09-01	20:07:01	Av. 25 de Julio y Callejón 10, Guayaquil	Sur	Televisor	Samsung	220.40	160.33	60.07	31

Rendimiento de las consultas con EXPLAIN sin creación de ÍNDICES

1. Dispositivos con mayor consumo energético

The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

```
-- ¿Que dispositivos tienen mayor consumo energético?
EXPLAIN
SELECT
    d.nombre_dispositivo,
    d.modelo,
    m.nombre_marca,
    ce.consumo_kwh
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
ON ce.id_dispositivo = d.id_dispositivo
INNER JOIN marcas AS m
ON d.id_marca = m.id_marca
ORDER BY ce.consumo_kwh DESC
LIMIT 3;
```

The results grid shows the following data:

id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	SIMPLE	ce	NULL	ALL	id_dispositivo	NULL	NULL	NULL	16	100.00	Using filesort
1	SIMPLE	d	NULL	eq_ref	PRIMARY, id_marca	PRIMARY	4	proyecto_5.ce.id_dispositivo	1	100.00	NULL
1	SIMPLE	m	NULL	eq_ref	PRIMARY	PRIMARY	4	proyecto_5.d.id_marca	1	100.00	NULL

2. Hogares con consumo más eficiente

The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

```
-- ¿Que hogares tienen patrones de consumo más eficiente?
EXPLAIN
SELECT
    sz.descripcion AS Sector_Zona,
    h.direccion,
    h.integrantes,
    SUM(ce.consumo_kwh) AS consumo_total
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
    ON ce.id_dispositivo = d.id_dispositivo
INNER JOIN hogares AS h
    ON d.id_hogares = h.id_hogares
INNER JOIN sector_zona AS sz
    ON h.id_sector_zona = sz.id_sector_zona
GROUP BY h.id_hogares, sz.descripcion, h.direccion, h.integrantes
ORDER BY consumo_total ASC
```

The Result Grid shows the following execution plan:

id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	SIMPLE	sz	INDEX	index	PRIMARY	descripcion	202	INDEX	3	100.00	Using index; Using temporary; Using filesort
1	SIMPLE	h	INDEX	ALL	PRIMARY	INDEX	INDEX	INDEX	10	100.00	Using where; Using join buffer (hash join)
1	SIMPLE	d	INDEX	ref	PRIMARY, id_hogares	id_hogares	4	proyecto_5.h.id_hogares	1	100.00	Using index
1	SIMPLE	ce	INDEX	ref	id_dispositivo	id_dispositivo	4	proyecto_5.d.id_dispositivo	1	100.00	Using index

3. Días y horas con mayor consumo energético

The screenshot shows the MySQL Workbench interface. The query editor contains the following SQL code:

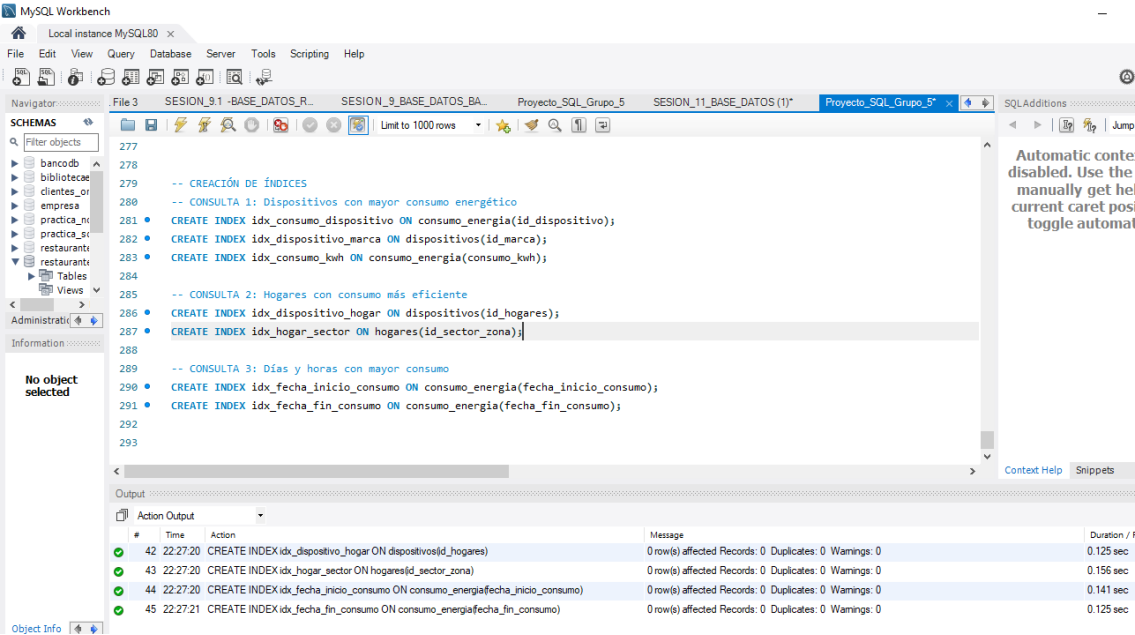
```
-- ¿Que dias y horas tienen mayor consumo energetico?
EXPLAIN
SELECT
    DATE(ce.fecha_inicio_consumo) AS dia,
    TIME(ce.fecha_inicio_consumo) AS hora,
    h.direccion AS hogar,
    sz.descripcion AS sector_zona,
    d.nombre_dispositivo,
    m.nombre_marca,
    SUM(ce.consumo_kwh) AS consumo_total,
    (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS promedio_general,
    SUM(ce.consumo_kwh) - (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS diferencia,
    ROUND(AVG(DATEDIFF(ce.fecha_fin_consumo, ce.fecha_inicio_consumo)), 0) AS dias_consumo
FROM consumo_energia AS ce
INNER JOIN dispositivos AS d
    ON ce.id_dispositivo = d.id_dispositivo
```

The Result Grid shows the following execution plan:

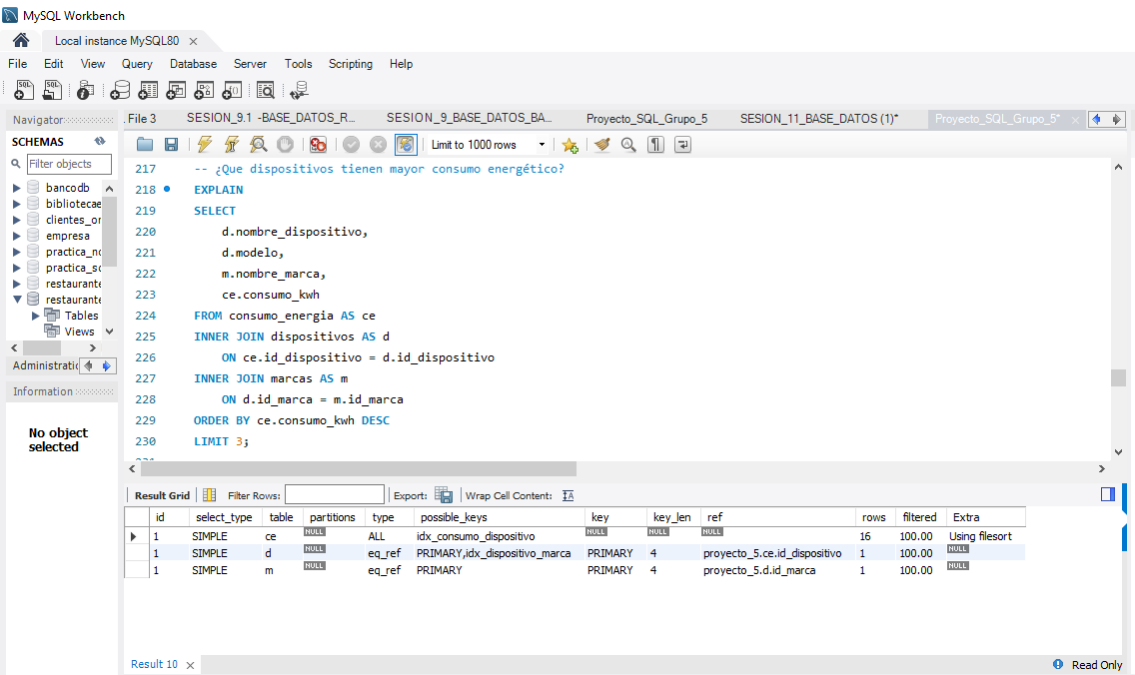
id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	PRIMARY	sz	INDEX	index	PRIMARY	descripcion	202	INDEX	3	100.00	Using index; Using
1	PRIMARY	h	INDEX	ALL	PRIMARY	INDEX	INDEX	INDEX	10	100.00	Using where; Using
1	PRIMARY	d	INDEX	ref	PRIMARY, id_hogares, id_marca	id_hogares	4	proyecto_5.h.id_hogares	1	100.00	Using index
1	PRIMARY	ce	INDEX	ref	id_dispositivo	id_dispositivo	4	proyecto_5.d.id_dispositivo	1	100.00	Using index

Rendimiento de las consultas con EXPLAIN y creación de ÍNDICES

Creación de índices



1. Dispositivos con mayor consumo energético



2. Hogares con consumo más eficiente

The screenshot shows the MySQL Workbench interface. The left sidebar displays the 'Schemas' panel with a tree view of the database structure, including tables like 'consumo_energia', 'dispositivos', and 'hogares'. The main editor window contains a SQL query starting with a comment: '-- ¿Que hogares tienen patrones de consumo más eficiente?'. The query uses an EXPLAIN statement to analyze a SELECT query that joins 'consumo_energia', 'dispositivos', and 'hogares' tables, grouped by home ID and ordered by total consumption. The 'Result Grid' at the bottom shows the execution plan, detailing the select type, table, partitions, type, possible keys, key, key_len, ref, rows, filtered, and extra information for each step of the query execution.

```
233 -- ¿Que hogares tienen patrones de consumo más eficiente?
234 EXPLAIN
235 SELECT
236     sz.descripcion AS Sector_Zona,
237     h.direccion,
238     h.integrantes,
239     SUM(ce.consumo_kwh) AS consumo_total
240 FROM consumo_energia AS ce
241 INNER JOIN dispositivos AS d
242     ON ce.id_dispositivo = d.id_dispositivo
243 INNER JOIN hogares AS h
244     ON d.id_hogares = h.id_hogares
245 INNER JOIN sector_zona AS sz
246     ON h.id_sector_zona = sz.id_sector_zona
247 GROUP BY h.id_hogares, sz.descripcion, h.direccion, h.integrantes
248 ORDER BY consumo_total ASC
249 LIMIT 3;
```

id	select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	SIMPLE	sz	NULL	index	PRIMARY	descripcion	202	NULL	3	100.00	Using index
1	SIMPLE	h	NULL	ref	PRIMARY,idx_hogar_sector	idx_hogar_sector	4	proyecto_5.sz.id_sector_zona	3	100.00	Using index
1	SIMPLE	d	NULL	ref	PRIMARY,idx_dispositivo_hogar	idx_dispositivo_hogar	4	proyecto_5.h.id_hogares	1	100.00	Using index
1	SIMPLE	ce	NULL	ref	idx_consumo_dispositivo	idx_consumo_dispositivo	4	proyecto_5.d.id_dispositivo	1	100.00	Using index

3. Días y horas con mayor consumo energético

The screenshot shows the MySQL Workbench interface. The left sidebar displays the 'Schemas' panel. The main editor window contains a SQL query starting with a comment: '-- ¿Que días y horas tienen mayor consumo energetico?'. The query uses an EXPLAIN statement to analyze a SELECT query that calculates the average energy consumption by day and hour, joining 'consumo_energia' and 'dispositivos' tables. The 'Result Grid' at the bottom shows the execution plan, detailing the select type, table, partitions, type, possible keys, key, key_len, ref, rows, filtered, and extra information for each step of the query execution.

```
252 -- ¿Que días y horas tienen mayor consumo energetico?
253 EXPLAIN
254 SELECT
255     DATE(ce.fecha_inicio_consumo) AS dia,
256     TIME(ce.fecha_inicio_consumo) AS hora,
257     h.direccion AS hogar,
258     sz.descripcion AS sector_zona,
259     d.nombre_dispositivo,
260     m.nombre_marca,
261     SUM(ce.consumo_kwh) AS consumo_total,
262     (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS promedio_general,
263     SUM(ce.consumo_kwh) - (SELECT ROUND(AVG(consumo_kwh), 2) FROM consumo_energia) AS diferencia,
264     ROUND(AVG(DATEDIFF(ce.fecha_fin_consumo, ce.fecha_inicio_consumo)), 0) AS dias_consumo
265 FROM consumo_energia AS ce
```

select_type	table	partitions	type	possible_keys	key	key_len	ref	rows	filtered	Extra
PRIMARY	sz	NULL	index	PRIMARY	descripcion	202	NULL	3	100.00	Using index
PRIMARY	h	NULL	ref	PRIMARY,idx_hogar_sector	idx_hogar_sector	4	proyecto_5.sz.id_sector_zona	3	100.00	Using index
PRIMARY	d	NULL	ref	PRIMARY,idx_dispositivo_marca,idx_dispositivo...	idx_dispositivo_hogar	4	proyecto_5.h.id_hogares	1	100.00	Using index
PRIMARY	m	NULL	eq_ref	PRIMARY	PRIMARY	4	proyecto_5.d.id_marca	1	100.00	Using index
PRIMARY	ce	NULL	ref	idx_consumo_dispositivo	idx_consumo_dispositivo	4	proyecto_5.d.id_dispositivo	1	100.00	Using index
SUBQUERY	consumo_energia	NULL	index	NULL	idx_consumo_kwh	5	NULL	16	100.00	Using index
SUBQUERY	consumo_energia	NULL	index	NULL	idx_consumo_kwh	5	NULL	16	100.00	Using index