# Задание 1. Определение недостающих ключей и индексов

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| **№** | **Команда на создание индекса** | **Обоснование** |
| 1 | CREATE INDEX idx\_address\_objects\_type\_actual\_active\_enddate  ON gar.address\_objects (typename, isactual, isactive, enddate); | В запросах часто фильтруем по типу (typename = 'ул', 'г', 'д', 'с') и по актуальности. |
| 2 | CREATE INDEX idx\_adm\_hierarchy\_regioncode\_objectid  ON gar.adm\_hierarchy (regioncode, objectid); | Фильтрация по региону (regioncode = '73') — очень частый сценарий |
| 3 | CREATE INDEX idx\_houses\_previd\_actual  ON gar.houses (previd, isactual);  CREATE INDEX idx\_houses\_nextid\_actual  ON gar.houses (nextid, isactual); | Для поиска историчности и связей между версиями домов (например, в П7) |
| 4 | CREATE INDEX idx\_change\_history\_objectid\_changedate  ON gar.change\_history (objectid, changedate DESC); | Для поиска изменений, связанных с конкретным объектом, с сортировкой по дате |
| 5 | CREATE INDEX idx\_adm\_hierarchy\_parentobjid\_objectid  ON gar.adm\_hierarchy (parentobjid, objectid); | Основной способ обхода иерархии — дочерний объект (objectid) → родитель (parentobjid) |

# Задание 2. Написание запросов (базовый уровень)

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| **№** | **Текст запроса** | **Скриншот результата[[1]](#footnote-1)** |
| Б1 | SELECT ao.name  FROM gar.adm\_hierarchy ah  JOIN gar.address\_objects ao ON ah.objectid = ao.objectid  WHERE ah.parentobjid = 1325538 -- Барыш  AND ao.typename = 'ул'  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  AND ao.name ILIKE 'Л%'  ORDER BY ao.name; |  |
| Б2 | SELECT COUNT(\*)  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid  WHERE ao.typename = 'снт'  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  AND ah.regioncode = '73'; |  |
| Б3 | SELECT ao\_street.name, COUNT(h.objectid) AS house\_count  FROM gar.houses h  JOIN gar.adm\_hierarchy ah\_house ON h.objectid = ah\_house.objectid  JOIN gar.address\_objects ao\_street ON ah\_house.parentobjid = ao\_street.objectid  WHERE h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date  AND ao\_street.typename = 'ул'  AND ao\_street.isactual = true  AND ao\_street.isactive = true  AND ao\_street.enddate >= current\_date  AND EXISTS (  SELECT 1  FROM gar.adm\_hierarchy ah\_street  WHERE ah\_street.objectid = ao\_street.objectid  AND ah\_street.parentobjid = 1325680 -- Ульяновск  )  GROUP BY ao\_street.objectid, ao\_street.name  ORDER BY house\_count DESC  LIMIT 1; |  |
| Б4 | SELECT COUNT(cp.objectid) AS car\_place\_count  FROM gar.car\_places cp  JOIN gar.adm\_hierarchy ah\_cp ON cp.objectid = ah\_cp.objectid  WHERE ah\_cp.parentobjid IN (  -- Все актуальные дома №77  SELECT h.objectid  FROM gar.houses h  JOIN gar.adm\_hierarchy ah\_house ON h.objectid = ah\_house.objectid  WHERE h.housenum = '77'  AND h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date  AND ah\_house.parentobjid = (  -- objectid улицы Воробьева в Ульяновске  SELECT ao\_street.objectid  FROM gar.address\_objects ao\_street  JOIN gar.adm\_hierarchy ah\_street ON ao\_street.objectid = ah\_street.objectid  WHERE ao\_street.name ILIKE 'Воробьева'  AND ao\_street.typename = 'ул'  AND ao\_street.isactual = true  AND ao\_street.isactive = true  AND ao\_street.enddate >= current\_date  AND ah\_street.parentobjid = (  -- objectid города Ульяновск  SELECT ao\_city.objectid  FROM gar.address\_objects ao\_city  WHERE ao\_city.name = 'Ульяновск'  AND ao\_city.typename = 'г'  AND ao\_city.isactual = true  AND ao\_city.isactive = true  AND ao\_city.enddate >= current\_date  )  )  )  AND cp.isactual = true  AND cp.isactive = true  AND cp.enddate >= current\_date; |  |
| Б5 | SELECT  h.objectid AS object\_id,  COUNT(ch.changeid) AS change\_count,  MAX(ch.changedate) AS last\_change\_date  FROM gar.houses h  LEFT JOIN gar.change\_history ch ON h.objectid = ch.objectid  WHERE h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date  GROUP BY h.objectid  ORDER BY change\_count DESC, last\_change\_date DESC  LIMIT 10; |  |
| Б6 | WITH actual\_houses AS (  SELECT objectid, housenum  FROM gar.houses  WHERE isactual = true  AND isactive = true  AND enddate >= current\_date  ),  apartment\_counts AS (  SELECT  ah.parentobjid AS house\_objectid,  COUNT(a.objectid) AS apartment\_count  FROM gar.apartments a  JOIN gar.adm\_hierarchy ah ON a.objectid = ah.objectid  WHERE a.isactual = true  AND a.isactive = true  AND a.enddate >= current\_date  GROUP BY ah.parentobjid  ),  house\_info AS (  SELECT  ac.house\_objectid AS object\_id,  ac.apartment\_count,  h.housenum  FROM apartment\_counts ac  JOIN actual\_houses h ON ac.house\_objectid = h.objectid  ),  address\_parts AS (  SELECT  hi.object\_id,  hi.apartment\_count,  hi.housenum,  ao\_region.name AS region\_name,  ao\_city.name AS city\_name,  ao\_street.name AS street\_name  FROM house\_info hi  -- Дом → улица  JOIN gar.adm\_hierarchy ah\_to\_street ON hi.object\_id = ah\_to\_street.objectid  JOIN gar.address\_objects ao\_street ON ah\_to\_street.parentobjid = ao\_street.objectid  -- Улица → город  JOIN gar.adm\_hierarchy ah\_to\_city ON ao\_street.objectid = ah\_to\_city.objectid  JOIN gar.address\_objects ao\_city ON ah\_to\_city.parentobjid = ao\_city.objectid  -- Город → регион  JOIN gar.adm\_hierarchy ah\_to\_region ON ao\_city.objectid = ah\_to\_region.objectid  JOIN gar.address\_objects ao\_region ON ah\_to\_region.parentobjid = ao\_region.objectid  WHERE  ao\_street.typename = 'ул'  AND ao\_city.typename = 'г'  AND ao\_region.level = 1 -- регион — уровень 1  AND ao\_street.isactual = true AND ao\_street.isactive = true AND ao\_street.enddate >= current\_date  AND ao\_city.isactual = true AND ao\_city.isactive = true AND ao\_city.enddate >= current\_date  AND ao\_region.isactual = true AND ao\_region.isactive = true AND ao\_region.enddate >= current\_date  )  SELECT  object\_id,  apartment\_count,  region\_name || ', ' || city\_name || ', ' || street\_name || ', ' || housenum AS full\_address  FROM address\_parts  ORDER BY apartment\_count DESC  LIMIT 10; |  |
| Б7 | SELECT  ah\_room.parentobjid AS object\_id,  COUNT(r.objectid) AS room\_count  FROM gar.rooms r  JOIN gar.adm\_hierarchy ah\_room ON r.objectid = ah\_room.objectid  WHERE  r.isactual = true  AND r.isactive = true  AND r.enddate >= current\_date  AND ah\_room.regioncode = '73' -- Ульяновская область  GROUP BY ah\_room.parentobjid  ORDER BY room\_count DESC  LIMIT 10; |  |
| Б8 | WITH actual\_apartments AS (  SELECT a.objectid  FROM gar.apartments a  JOIN gar.adm\_hierarchy ah ON a.objectid = ah.objectid  WHERE a.isactual = true  AND a.isactive = true  AND a.enddate >= current\_date  AND ah.regioncode = '73'  ),  apartments\_with\_cadastr AS (  SELECT DISTINCT ap.objectid  FROM gar.apartments\_params ap  WHERE ap.typeid = 8  AND ap.value IS NOT NULL  AND ap.value != ''  AND ap.objectid IN (SELECT objectid FROM actual\_apartments)  )  SELECT  ROUND(  COUNT(ac.objectid) \* 100.0 / NULLIF(COUNT(aa.objectid), 0),  2  ) AS percentage\_with\_cadastr  FROM actual\_apartments aa  LEFT JOIN apartments\_with\_cadastr ac ON aa.objectid = ac.objectid; |  |
| Б9 | SELECT DISTINCT ao.name  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid  WHERE ah.regioncode = '73'  AND ao.typename = 'тракт'  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  ORDER BY ao.name; |  |
| Б10 | SELECT  EXTRACT(YEAR FROM ao.startdate)::INTEGER AS year,  COUNT(\*) AS street\_count  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid  WHERE ah.parentobjid = 1325680 -- Ульяновск  AND ao.typename = 'ул'  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  AND ao.startdate >= '2000-01-01'  GROUP BY year  ORDER BY street\_count DESC, year DESC  LIMIT 5; |  |

# Задание 3. Написание запросов (продвинутый уровень)

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| **№** | **Текст запроса** | **Скриншот результата** |
| П1 | SELECT  ao\_street.name AS street\_name,  COUNT(DISTINCT hp.value) AS distinct\_postal\_count,  STRING\_AGG(DISTINCT hp.value, ',' ORDER BY hp.value) AS postal\_codes  FROM gar.houses h  JOIN gar.adm\_hierarchy ah\_house ON h.objectid = ah\_house.objectid  JOIN gar.address\_objects ao\_street ON ah\_house.parentobjid = ao\_street.objectid  JOIN gar.houses\_params hp ON h.objectid = hp.objectid  WHERE  ao\_street.typename = 'ул'  AND ao\_street.isactual = true  AND ao\_street.isactive = true  AND ao\_street.enddate >= current\_date  AND EXISTS (  SELECT 1  FROM gar.adm\_hierarchy ah\_street  WHERE ah\_street.objectid = ao\_street.objectid  AND ah\_street.parentobjid = 1325680 -- Ульяновск  )  AND h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date  AND hp.typeid = 5  AND hp.value IS NOT NULL  AND hp.value != ''  GROUP BY ao\_street.objectid, ao\_street.name  ORDER BY distinct\_postal\_count DESC, ao\_street.name  LIMIT 1; |  |
| П2 | WITH RECURSIVE mun\_path AS (  SELECT mh.objectid, mh.parentobjid, 0 AS depth  FROM gar.mun\_hierarchy mh  WHERE mh.objectid = 48159476  UNION ALL  SELECT mh.objectid, mh.parentobjid, mp.depth + 1  FROM gar.mun\_hierarchy mh  JOIN mun\_path mp ON mh.objectid = mp.parentobjid  WHERE mh.parentobjid IS NOT NULL  ),  names AS (  SELECT DISTINCT ao.name, mp.depth  FROM mun\_path mp  JOIN gar.address\_objects ao ON mp.objectid = ao.objectid  WHERE ao.isactual = true AND ao.isactive = true AND ao.enddate >= current\_date  ),  house\_num AS (  SELECT housenum FROM gar.houses  WHERE objectid = 48159476 AND isactual = true AND isactive = true AND enddate >= current\_date  )  SELECT  STRING\_AGG(name, ', ' ORDER BY depth DESC) || ', ' || (SELECT housenum FROM house\_num)  AS full\_mun\_address  FROM names; |  |
| П3 | WITH rural\_settlements AS (  SELECT  ao.objectid,  ao.name,  ao.typename,  ah.parentobjid AS district\_id  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid    WHERE ao.typename IN ('д', 'с')  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  ),  duplicates AS (  SELECT  district\_id,  name,  typename,  COUNT(\*) AS cnt  FROM rural\_settlements  GROUP BY district\_id, name, typename  HAVING COUNT(\*) > 1  )  SELECT  ao\_region.name || ' обл., ' ||  ao\_district.name || ' р-н, ' ||  CASE  WHEN d.typename = 'д' THEN 'д. '  WHEN d.typename = 'с' THEN 'с. '  ELSE d.typename || '. '  END || d.name AS full\_address,  d.cnt AS repeat\_count  FROM duplicates d  JOIN gar.address\_objects ao\_district ON d.district\_id = ao\_district.objectid  JOIN gar.adm\_hierarchy ah\_district ON ao\_district.objectid = ah\_district.objectid  JOIN gar.address\_objects ao\_region ON ah\_district.parentobjid = ao\_region.objectid  WHERE ao\_region.level = 1  AND ao\_district.isactual = true AND ao\_district.isactive = true AND ao\_district.enddate >= current\_date  AND ao\_region.isactual = true AND ao\_region.isactive = true AND ao\_region.enddate >= current\_date  ORDER BY full\_address; |  |
| П4 | SELECT  h.housenum,  hp.value AS oktmo  FROM gar.houses h  JOIN gar.adm\_hierarchy ah\_house ON h.objectid = ah\_house.objectid  JOIN gar.address\_objects ao\_street ON ah\_house.parentobjid = ao\_street.objectid  LEFT JOIN gar.houses\_params hp ON h.objectid = hp.objectid AND hp.typeid = 7 -- ОКТМО  WHERE ao\_street.objectid = 1335424 -- улица "Верхняя площадка"  AND h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date; |  |
| П5 | WITH street\_history AS (  SELECT  ao.objectid,  ao.name,  ao.startdate,  ao.enddate,  ao.isactual,  ah.parentobjid AS city\_id  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid  WHERE ah.parentobjid = 1325470 -- Димитровград  AND ao.typename = 'ул'  AND ao.isactive = true  ),  streets\_with\_changes AS (  SELECT  sh.objectid,  sh.name,  sh.startdate,  MAX(sh.startdate) OVER (PARTITION BY sh.objectid) AS max\_startdate\_for\_object  FROM street\_history sh  WHERE sh.startdate >= '2015-01-01'  AND EXISTS (  SELECT 1  FROM gar.address\_objects ao2  WHERE ao2.objectid = sh.objectid  AND ao2.name != sh.name  AND ao2.startdate < sh.startdate  )  )  SELECT  ao\_current.name AS current\_name,  EXTRACT(YEAR FROM swc.max\_startdate\_for\_object)::INTEGER AS last\_change\_year  FROM streets\_with\_changes swc  JOIN gar.address\_objects ao\_current ON swc.objectid = ao\_current.objectid  WHERE ao\_current.isactual = true  AND ao\_current.isactive = true  AND ao\_current.enddate >= current\_date  ORDER BY current\_name; |  |
| П6 | SELECT  ao.name,  COUNT(\*) AS repeat\_count  FROM gar.address\_objects ao  JOIN gar.adm\_hierarchy ah ON ao.objectid = ah.objectid  WHERE ah.regioncode = '73' -- Ульяновская обл.  AND ao.typename = 'ул' -- только улицы  AND ao.isactual = true  AND ao.isactive = true  AND ao.enddate >= current\_date  GROUP BY ao.name  ORDER BY repeat\_count DESC, ao.name  LIMIT 10; |  |
| П7 | WITH split\_houses AS (  -- Найдём актуальные дома, у которых есть предыдущая версия (previd)  SELECT  h.objectid,  h.housenum,  h.previd,  ah.parentobjid AS street\_id  FROM gar.houses h  JOIN gar.adm\_hierarchy ah ON h.objectid = ah.objectid  WHERE h.isactual = true  AND h.isactive = true  AND h.enddate >= current\_date  AND h.previd IS NOT NULL  AND h.previd != 0  ),  grouped\_splits AS (  -- Сгруппируем актуальные дома по previd и посчитаем, сколько новых частей  SELECT  sh.previd,  COUNT(\*) AS new\_parts\_count,  ARRAY\_AGG(  h.housenum || ' (' || ao\_street.name || ', ' || ao\_city.name || ', ' || ao\_region.name || ')'  ORDER BY h.housenum  ) AS new\_house\_addresses  FROM split\_houses sh  JOIN gar.houses h ON sh.objectid = h.objectid  JOIN gar.adm\_hierarchy ah ON h.objectid = ah.objectid  JOIN gar.address\_objects ao\_street ON ah.parentobjid = ao\_street.objectid  JOIN gar.adm\_hierarchy ah\_city ON ao\_street.objectid = ah\_city.objectid  JOIN gar.address\_objects ao\_city ON ah\_city.parentobjid = ao\_city.objectid  JOIN gar.adm\_hierarchy ah\_region ON ao\_city.objectid = ah\_region.objectid  JOIN gar.address\_objects ao\_region ON ah\_region.parentobjid = ao\_region.objectid  WHERE ao\_street.isactual = true AND ao\_street.isactive = true AND ao\_street.enddate >= current\_date  AND ao\_city.isactual = true AND ao\_city.isactive = true AND ao\_city.enddate >= current\_date  AND ao\_region.isactual = true AND ao\_region.isactive = true AND ao\_region.enddate >= current\_date  GROUP BY sh.previd  HAVING COUNT(\*) > 2 -- разделены более чем на 2 части  )  SELECT  ao\_orig.name || ', ' || ao\_city\_orig.name || ', ' || ao\_region\_orig.name || ', ' || orig\_house.housenum AS original\_full\_address,  gs.new\_house\_addresses AS new\_parts\_addresses  FROM grouped\_splits gs  JOIN gar.houses orig\_house ON gs.previd = orig\_house.objectid  JOIN gar.adm\_hierarchy ah\_orig ON orig\_house.objectid = ah\_orig.objectid  JOIN gar.address\_objects ao\_orig ON ah\_orig.parentobjid = ao\_orig.objectid  JOIN gar.adm\_hierarchy ah\_city\_orig ON ao\_orig.objectid = ah\_city\_orig.objectid  JOIN gar.address\_objects ao\_city\_orig ON ah\_city\_orig.parentobjid = ao\_city\_orig.objectid  JOIN gar.adm\_hierarchy ah\_region\_orig ON ao\_city\_orig.objectid = ah\_region\_orig.objectid  JOIN gar.address\_objects ao\_region\_orig ON ah\_region\_orig.parentobjid = ao\_region\_orig.objectid  WHERE ao\_orig.isactual = true AND ao\_orig.isactive = true AND ao\_orig.enddate >= current\_date  AND ao\_city\_orig.isactual = true AND ao\_city\_orig.isactive = true AND ao\_city\_orig.enddate >= current\_date  AND ao\_region\_orig.isactual = true AND ao\_region\_orig.isactive = true AND ao\_region\_orig.enddate >= current\_date; |  |
| П8 | SELECT  nd.name,  nd.number,  nd.date,  COUNT(ch.changeid) AS change\_count  FROM gar.change\_history ch  JOIN gar.normative\_documents nd ON ch.ndocid = nd.id  GROUP BY nd.id, nd.name, nd.number, nd.date  ORDER BY change\_count DESC  LIMIT 5; |  |

# Задание 4. Поиск проблем в данных

1. Некорректное значение housenum: В gar.houses обнаружен дом с housenum = 'Психушка', что противоречит логике адресных данных.
2. Некорректные связи через previd в gar.houses. Найдены группы актуальных домов, у которых previd указывает на один и тот же старый дом, но при этом новые дома находятся в совсем других населённых пунктах. Это означает, что связь previd не отражает реальное разделение, а указывает на ошибки в историчности данных
3. Дублирующиеся актуальные улицы с одинаковым именем в одном городе

В одном городе (например, «Барыш», «Новоульяновск») существуют разные актуальные улицы с одинаковым названием.

Пример: Улица «45 Стрелковой Дивизии» встречается 2 раза в городе «Барыш».

Причина: Нарушение логики адресации — в одном городе не может быть двух актуальных улиц с одинаковым названием.

1. Актуальные дома с enddate в прошлом

В gar.houses обнаружены записи, у которых isactual = true, но enddate < current\_date.

Пример: objectid = 2246457, housenum = "472", enddate = "2019-11-22".

1. Нарушение ссылочной целостности в adm\_hierarchy

Описание: В gar.adm\_hierarchy встречаются записи, у которых parentobjid указывает на несуществующий objectid в таблице gar.address\_objects.

Пример: parentobjid = 32148641 — в address\_objects нет objectid = 32148641.

Причина: Нарушение целостности данных — дочерний объект ссылается на несуществующий родительский.

1. Кадастровые номера, не соответствующие региону

В gar.houses\_params обнаружены дома в Ульяновской области (regioncode = '73'), у которых кадастровый номер начинается не с 73: (например, 72:21:...).

Пример: value = "72:21:310510:56", housenum = "38", city\_name = "Ленина", regioncode = "73".

Кадастровый номер должен соответствовать региону, в котором находится дом.

1. Не обязательно на скриншоте представлять весь вывод. Можно ограничиться частью. [↑](#footnote-ref-1)