

מיניפ בסנ"ת שלב 3

נועה לשס והדס קרמן

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פונקציות

פונקציה ראשונה - evaluate_class_popularity

תיאור הפונקציה: הפונקציה מקבלת פרמטר יחיד והוא מספר שיעור. פונקציה זאת מחשבת את הפופולריות של שיעור שהתקבל על פי אחוזי התפוסה שלו ומחזירה את מספר השיעור, אחוז הפופולריות והמלצה (לפי אחוזי הפופולריות למשל: שיעור פופולרי מאד, כדאי לחשוב על הרחבה וכדו'). אם השיעור הניתן כפרמטר לא נמצא (לא קיים בבסיס הנתונים) נזרקת שגיאה.

קוד הפונקציה:

```
1 CREATE OR REPLACE FUNCTION evaluate_class_popularity(  
2     p_class_number IN NUMBER,  
3     p_result_cursor OUT SYS_REFCURSOR  
4 ) RETURN class_popularity_result  
5 AS  
6     v_current_capacity NUMBER;  
7     v_max_capacity NUMBER;  
8     v_occupancy_rate NUMBER;  
9     v_class_name VARCHAR2(15);  
10    v_recommendation VARCHAR2(200);  
11    v_result class_popularity_result;  
12  
13    -- Custom exception  
14    class_not_found EXCEPTION;  
15    PRAGMA EXCEPTION_INIT(class_not_found, -20001);  
16 BEGIN  
17     -- Check if the class exists  
18     BEGIN  
19         SELECT cl.capacity, cl.class_name  
20         INTO v_max_capacity, v_class_name  
21         FROM class_lesson cl  
22         WHERE cl.class_number = p_class_number;  
23     EXCEPTION  
24         WHEN NO_DATA_FOUND THEN  
25             RAISE class_not_found;  
26     END;  
27  
28     -- Calculate current occupancy  
29     SELECT COUNT(*)  
30     INTO v_current_capacity  
31     FROM takes  
32     WHERE class_number = p_class_number;  
33  
34     -- Calculate occupancy rate  
35     v_occupancy_rate := (v_current_capacity / v_max_capacity) * 100;  
36  
37     -- Evaluate popularity and make recommendation  
38     IF v_occupancy_rate >= 90 THEN  
39         v_recommendation := 'Highly popular. Consider opening a new session.';  
40     ELSIF v_occupancy_rate >= 75 THEN  
41         v_recommendation := 'Popular. Monitor closely for potential expansion.';  
42     ELSIF v_occupancy_rate >= 50 THEN  
43         v_recommendation := 'Moderate popularity. No immediate action required.';  
44     ELSE  
45         v_recommendation := 'Low popularity. Consider marketing or schedule adjustments.';  
46     END IF;  
47  
48     -- Create the result object  
49     v_result := class_popularity_result(p_class_number, v_occupancy_rate, v_recommendation);  
50  
51     -- Open the cursor with the same values  
52     OPEN p_result_cursor FOR  
53     SELECT p_class_number AS class_number,  
54            v_occupancy_rate AS popularity_rate,  
55            v_recommendation AS recommendation  
56     FROM dual;  
57  
58     RETURN v_result;  
59 EXCEPTION  
60     WHEN class_not_found THEN  
61         -- Open cursor with error message  
62         OPEN p_result_cursor FOR  
63         SELECT NULL AS class_number,  
64                NULL AS popularity_rate,  
65                'Error: Class not found.' AS recommendation  
66         FROM dual;  
67         -- Return NULL for all fields if class is not found  
68         RETURN class_popularity_result(NULL, NULL, 'Error: Class not found.');
```

הרצה: נריץ עם מספר שיעור 150 לדוגמא.

```

1 declare
2   -- Non-scalar parameters require additional processing
3   result class_popularity_result;
4 begin
5   -- Call the function
6   result := evaluate_class_popularity(p_class_number => :p_class_number,
7                                       p_result_cursor => :p_result_cursor);
8 end;

```

| Variable | Type | Value |
|-----------------|--------|----------|
| p_class_number | Float | 150 |
| p_result_cursor | Cursor | <Cursor> |

1:1 0:02 hadasNoa@XE Executed in 2.343 seconds

ונקבל בחזרה curser עם מס' השיעור, אחוזי הפופולריות שלו והמלצה.

| CLASS_NUMBER | POPULARITY_RATE | RECOMMENDATION |
|--------------|-----------------|---|
| 1 | 150 | 10.5263157894737 |
| | | Low popularity. Consider marketing or schedule adjustments. ... |

במקרה שנכניס שיעור שלא קיים בבסיס הנתונים למשל 10000:

| Variable | Type | Value |
|-----------------|--------|----------|
| p_class_number | Float | 100000 |
| p_result_cursor | Cursor | <Cursor> |

1:1 0:01 hadasNoa@XE Executed in 1.734 seconds

נקבל שגיאה:

| CLASS_NUMBER | POPULARITY_RATE | RECOMMENDATION |
|--------------|-----------------|-----------------------------|
| 1 | | Error: Class not found. ... |

פונקציה שניה - get_all_devices_maintenance

תיאור הפונקציה: הפונקציה עוברת על כל מכשירי הכושר בבסיס הנתונים (ע"י curser) ומגדירה עבור כל מכשיר על פי כמות השימוש בו את סוג התחזוקה הנצרך עבורו – full service עבור מכשירים שמשתמשים בהם ביותר מ-15 שיעורים, inspection עבור מכשירים שמשתמשים בהם בין 8 ל-15 שיעורים routine check עבור מכשירים שמשתמשים בהם בפחות מ-8 שיעורים. הפונקציה מחזירה curser – טבלה של כל המכשירים עם הפרטים שלהם, מס השיעורים בהם משתמשים בכל אחד, סוג התחזוקה שנצרך עבור כל אחד מהם וכן תאריך התחזוקה (תלוי בסוג התחזוקה הנצרך).

קוד הפונקציה:

```

1 CREATE OR REPLACE FUNCTION get_all_devices_maintenance
2 RETURN SYS_REFCURSOR
3 AS
4     v_result SYS_REFCURSOR;
5
6     -- Declare constants for maintenance thresholds
7     c_full_service_threshold CONSTANT NUMBER := 15;
8     c_inspection_threshold CONSTANT NUMBER := 8;
9
10 BEGIN
11     OPEN v_result FOR
12         SELECT d.device_number, d.device_model, d.hall_number, d.gym_number,
13             g.gym_name, COUNT(u.class_number) AS usage_count,
14             CASE
15                 WHEN COUNT(u.class_number) >= c_full_service_threshold THEN 'Full Service'
16                 WHEN COUNT(u.class_number) >= c_inspection_threshold THEN 'Inspection'
17                 ELSE 'Routine Check'
18             END AS maintenance_type,
19             CASE
20                 WHEN COUNT(u.class_number) >= c_full_service_threshold THEN SYSDATE + 7
21                 WHEN COUNT(u.class_number) >= c_inspection_threshold THEN SYSDATE + 14
22                 ELSE SYSDATE + 30
23             END AS maintenance_date
24         FROM device d
25         JOIN hall h ON d.hall_number = h.hall_number AND d.gym_number = h.gym_number
26         JOIN gym g ON h.gym_number = g.gym_number
27         LEFT JOIN used_in u ON d.device_number = u.device_number
28         GROUP BY d.device_number, d.device_model, d.hall_number, d.gym_number, g.gym_name;
29
30     RETURN v_result;
31 EXCEPTION
32 WHEN OTHERS THEN
33     DBMS_OUTPUT.PUT_LINE('An error occurred: ' || SQLERRM);
34     RAISE;
35 END get_all_devices_maintenance;
36

```

הרצה: נריץ את הפונקציה (לא מקבלת פרמטר)

```

1 begin
2     -- Call the function
3     :result := get_all_devices_maintenance;
4 end;

```

| Variable | Type | Value |
|----------|--------|----------|
| result | Cursor | <Cursor> |

hadasNoa@XE Executed in 0.984 seconds

ונקבל בחזרה curser עם כל המכשירים, עם הפרטים שלהם, מס השיעורים בהם משתמשים בכל אחד, סוג התחזוקה שנצרך עבור כל אחד מהם וכן תאריך התחזוקה (תלוי בסוג התחזוקה הנצרך).

| | DEVICE_NUMBER | DEVICE_MODEL | HALL_NUMBER | GYM_NUMBER | GYM_NAME | USAGE_COUNT | MAINTENANCE_TYPE | MAINTENANCE_DATE |
|----|---------------|---------------|-------------|------------|-------------------|-------------|------------------|---------------------|
| 1 | 15 | Cable Machine | 37 | 45 | Endurance Edge | 5 | Routine Check | 31/07/2024 04:31:01 |
| 2 | 26 | Spinning Bike | 18 | 44 | Fitness Zone | 4 | Routine Check | 31/07/2024 04:31:01 |
| 3 | 38 | Spinning Bike | 35 | 30 | The Fit Stop | 1 | Routine Check | 31/07/2024 04:31:01 |
| 4 | 39 | Cable Machine | 37 | 45 | Endurance Edge | 1 | Routine Check | 31/07/2024 04:31:01 |
| 5 | 42 | Stepmills | 44 | 4 | Fit & Fine | 3 | Routine Check | 31/07/2024 04:31:01 |
| 6 | 44 | Spinning Bike | 38 | 2 | Health Hub | 4 | Routine Check | 31/07/2024 04:31:01 |
| 7 | 45 | Cable Machine | 44 | 4 | Fit & Fine | 1 | Routine Check | 31/07/2024 04:31:01 |
| 8 | 47 | Weight Plates | 49 | 48 | Muscle Matters | 9 | Inspection | 15/07/2024 04:31:01 |
| 9 | 48 | Stepmills | 27 | 25 | Total Body Gym | 8 | Inspection | 15/07/2024 04:31:01 |
| 10 | 53 | Weight Plates | 46 | 23 | Endurance Edge | 0 | Routine Check | 31/07/2024 04:31:01 |
| 11 | 54 | Stepmills | 17 | 18 | Strength Station | 2 | Routine Check | 31/07/2024 04:31:01 |
| 12 | 68 | Spinning Bike | 38 | 2 | Health Hub | 0 | Routine Check | 31/07/2024 04:31:01 |
| 13 | 102 | Stepmills | 17 | 18 | Strength Station | 6 | Routine Check | 31/07/2024 04:31:01 |
| 14 | 103 | Treadmill | 8 | 46 | Flex Gym | 0 | Routine Check | 31/07/2024 04:31:01 |
| 15 | 105 | Cable Machine | 9 | 9 | Total Fitness | 7 | Routine Check | 31/07/2024 04:31:01 |
| 16 | 112 | Dumbbells | 45 | 22 | Fit Factory | 5 | Routine Check | 31/07/2024 04:31:01 |
| 17 | 113 | Weight Plates | 18 | 44 | Fitness Zone | 3 | Routine Check | 31/07/2024 04:31:01 |
| 18 | 120 | Stepmills | 27 | 25 | Total Body Gym | 3 | Routine Check | 31/07/2024 04:31:01 |
| 19 | 127 | Treadmill | 8 | 46 | Flex Gym | 2 | Routine Check | 31/07/2024 04:31:01 |
| 20 | 129 | Cable Machine | 9 | 9 | Total Fitness | 0 | Routine Check | 31/07/2024 04:31:01 |
| 21 | 157 | Treadmill | 12 | 17 | Power Performance | 4 | Routine Check | 31/07/2024 04:31:01 |
| 22 | 161 | Weight Plates | 18 | 44 | Fitness Zone | 5 | Routine Check | 31/07/2024 04:31:01 |
| 23 | 164 | Spinning Bike | 38 | 2 | Health Hub | 2 | Routine Check | 31/07/2024 04:31:01 |
| 24 | 167 | Weight Plates | 49 | 48 | Muscle Matters | 1 | Routine Check | 31/07/2024 04:31:01 |
| 25 | 189 | Cable Machine | 44 | 4 | Fit & Fine | 1 | Routine Check | 31/07/2024 04:31:01 |
| 26 | 203 | Weight Plates | 10 | 28 | Strength Haven | 0 | Routine Check | 31/07/2024 04:31:01 |
| 27 | 218 | Spinning Bike | 18 | 44 | Fitness Zone | 0 | Routine Check | 31/07/2024 04:31:01 |
| 28 | 222 | Stepmills | 17 | 18 | Strength Station | 3 | Routine Check | 31/07/2024 04:31:01 |
| 29 | 227 | Weight Plates | 10 | 28 | Strength Haven | 4 | Routine Check | 31/07/2024 04:31:01 |
| 30 | 229 | Treadmill | 12 | 17 | Power Performance | 0 | Routine Check | 31/07/2024 04:31:01 |
| 31 | 257 | Weight Plates | 18 | 44 | Fitness Zone | 6 | Routine Check | 31/07/2024 04:31:01 |
| 32 | 270 | Stepmills | 17 | 18 | Strength Station | 0 | Routine Check | 31/07/2024 04:31:01 |
| 33 | 275 | Weight Plates | 10 | 28 | Strength Haven | 0 | Routine Check | 31/07/2024 04:31:01 |
| 34 | 282 | Stepmills | 44 | 4 | Fit & Fine | 0 | Routine Check | 31/07/2024 04:31:01 |
| 35 | 285 | Cable Machine | 44 | 4 | Fit & Fine | 2 | Routine Check | 31/07/2024 04:31:01 |
| 36 | 286 | Dumbbells | 1 | 35 | Fit Body Gym | 0 | Routine Check | 31/07/2024 04:31:01 |
| 37 | 288 | Stepmills | 27 | 25 | Total Body Gym | 3 | Routine Check | 31/07/2024 04:31:01 |
| 38 | 298 | Dumbbells | 43 | 44 | Fitness Zone | 2 | Routine Check | 31/07/2024 04:31:01 |
| 39 | 301 | Treadmill | 1 | 35 | Fit Body Gym | 0 | Routine Check | 31/07/2024 04:31:01 |
| 40 | 303 | Cable Machine | 46 | 23 | Endurance Edge | 5 | Routine Check | 31/07/2024 04:31:01 |
| 41 | 316 | Dumbbells | 27 | 25 | Total Body Gym | 5 | Routine Check | 31/07/2024 04:31:01 |
| 42 | 331 | Treadmill | 45 | 22 | Fit Factory | 1 | Routine Check | 31/07/2024 04:31:01 |
| 43 | 350 | Dumbbells | 33 | 50 | Cardio Kings | 4 | Routine Check | 31/07/2024 04:31:01 |
| 44 | 361 | Treadmill | 46 | 23 | Endurance Edge | 6 | Routine Check | 31/07/2024 04:31:01 |
| 45 | 372 | Stepmills | 17 | 18 | Strength Station | 3 | Routine Check | 31/07/2024 04:31:01 |

פרוצדורות

update_classes_by_popularity - ראשונה

תיאור הפרוצדורה: הפרוצדורה מקבלת פרמטר יחיד והוא סף של אחוזי הפופולריות. פרוצדורה זאת מעדכנת את הקיבולת של שיעורים שנחשבים פופולריים (אחוז הפופולריות שלהם – שאותו היא מחשבת - גדול מהסף) ומעבירה אותם לאולם חדש באותו חדר כושר אם צריך, כלומר במקרה שהקיבולת של האולם שבו השיעור התקיים עד עכשיו קטנה מהקיבולת החדשה של השיעור. במקרה שלא נמצא אולם מתאים הפרוצדורה לא מעדכנת את השיעור. הפרוצדורה מדפיסה את כל השיעורים שעודכנו ומבדילה בין מקרים שבהם שונה האולם ואלו שלא. היא גם מדפיסה את השיעורים שהיה צריך לעדכן אך דולגו כפי שנכתב למעלה.

קוד הפרוצדורה:

```
1 CREATE OR REPLACE PROCEDURE update_classes_by_popularity(  
2   p_popularity_threshold IN NUMBER  
3 ) AS  
4 -- Record type for class information  
5 TYPE class_rec IS RECORD (  
6   class_number NUMBER,  
7   class_name VARCHAR2(15),  
8   capacity NUMBER,  
9   current_occupancy NUMBER,  
10  popularity_rate NUMBER,  
11  coach_id NUMBER,  
12  hall_number NUMBER,  
13  gym_number NUMBER  
14 );  
15  
16 -- Table type for storing multiple class records  
17 TYPE class_tab IS TABLE OF class_rec;  
18  
19 -- Cursor to fetch classes  
20 CURSOR class_cur IS  
21 SELECT cl.class_number, cl.class_name, cl.capacity,  
22        COUNT(t.person_id) AS current_occupancy,  
23        (COUNT(t.person_id) / cl.capacity * 100) AS popularity_rate,  
24        cl.person_id AS coach_id, cl.hall_number, cl.gym_number  
25 FROM class_lesson cl  
26 LEFT JOIN takes t ON cl.class_number = t.class_number  
27 GROUP BY cl.class_number, cl.class_name, cl.capacity, cl.person_id, cl.hall_number, cl.gym_number  
28 HAVING (COUNT(t.person_id) / cl.capacity * 100) >= p_popularity_threshold  
29 ORDER BY popularity_rate DESC;  
30  
31 v_classes class_tab;  
32 v_new_capacity NUMBER;  
33 v_new_hall_number NUMBER;  
34 v_new_gym_number NUMBER;  
35 v_coach_speciality VARCHAR2(50);  
36 v_update_count NUMBER := 0;  
37 v_skip_count NUMBER := 0;  
38 my_capacity NUMBER;  
39  
40 BEGIN  
41 -- Fetch classes into the table of records  
42 OPEN class_cur;  
43 FETCH class_cur BULK COLLECT INTO v_classes;  
44 CLOSE class_cur;
```

```

46 -- Process each class
47 FOR i IN 1..v_classes.COUNT LOOP
48 -- Get coach speciality
49 SELECT speciality INTO v_coach_speciality
50 FROM coach
51 WHERE person_id = v_classes(i).coach_id;
52
53 -- Calculate new capacity (10% increase, rounded up)
54 v_new_capacity := CEIL(v_classes(i).capacity * 1.1);
55
56 -- Find a suitable hall for the expanded class
57 SELECT aa.capacity INTO my_capacity
58 FROM hall aa
59 WHERE aa.hall_number = v_classes(i).hall_number;
60
61 IF my_capacity < v_new_capacity THEN
62 BEGIN
63 SELECT ha.hall_number, ha.gym_number
64 INTO v_new_hall_number, v_new_gym_number
65 FROM (
66 SELECT h.hall_number, h.gym_number
67 FROM hall h
68 WHERE h.capacity >= v_new_capacity
69 AND h.gym_number = v_classes(i).gym_number
70 AND h.hall_number != v_classes(i).hall_number
71 AND NOT EXISTS (
72 SELECT 1
73 FROM class_lesson cl
74 WHERE cl.hall_number = h.hall_number
75 AND cl.gym_number = h.gym_number
76 AND cl.class_day = (
77 SELECT cc.class_day
78 FROM class_lesson cc
79 WHERE cc.class_number = v_classes(i).class_number
80 )
81 AND cl.class_hour = (
82 SELECT ccc.class_hour
83 FROM class_lesson ccc
84 WHERE ccc.class_number = v_classes(i).class_number
85 )
86 ) ha
87 WHERE ROWNUM = 1;
88
89
90 -- Update the class
91 UPDATE class_lesson c1
92 SET c1.capacity = v_new_capacity,
93 c1.hall_number = v_new_hall_number,
94 c1.gym_number = v_new_gym_number
95 WHERE c1.class_number = v_classes(i).class_number;
96 commit;
97
98 v_update_count := v_update_count + 1;
99
100 -- Log the update
101 DBMS_OUTPUT.PUT_LINE('Updated Class: ' || v_classes(i).class_name ||
102 ' (ID: ' || v_classes(i).class_number || ')');
103 DBMS_OUTPUT.PUT_LINE('Old Hall Capacity: ' || my_capacity ||
104 ', New Capacity: ' || v_new_capacity ||
105 ', New Hall: ' || v_new_hall_number);
106 DBMS_OUTPUT.PUT_LINE('-----');
107
108 EXCEPTION
109 WHEN NO_DATA_FOUND THEN
110 -- No suitable hall found, skip this class
111 v_skip_count := v_skip_count + 1;
112 DBMS_OUTPUT.PUT_LINE('Skipped Class: ' || v_classes(i).class_name ||
113 ' (ID: ' || v_classes(i).class_number || ') - No suitable hall found');
114 DBMS_OUTPUT.PUT_LINE('-----');
115
116 END;
117 ELSE
118 -- Update the class
119 UPDATE class_lesson c2
120 SET c2.capacity = v_new_capacity
121 WHERE c2.class_number = v_classes(i).class_number;
122 commit;
123 v_update_count := v_update_count + 1;
124 -- Log the update
125 DBMS_OUTPUT.PUT_LINE('Updated Class: ' || v_classes(i).class_name ||
126 ' (ID: ' || v_classes(i).class_number || ')');
127 DBMS_OUTPUT.PUT_LINE('Old Hall Capacity: ' || my_capacity ||
128 ', New Capacity: ' || v_new_capacity ||
129 ', Same Hall: ');
130 DBMS_OUTPUT.PUT_LINE('-----');
131 END IF;
132 END LOOP;
133
134 -- Final summary
135 DBMS_OUTPUT.PUT_LINE('-----');
136 DBMS_OUTPUT.PUT_LINE('Update Summary:');
137 DBMS_OUTPUT.PUT_LINE('Classes updated: ' || v_update_count);
138 DBMS_OUTPUT.PUT_LINE('Classes skipped: ' || v_skip_count);
139 DBMS_OUTPUT.PUT_LINE('Total classes processed: ' || v_classes.COUNT);
140
141 EXCEPTION
142 WHEN OTHERS THEN
143 DBMS_OUTPUT.PUT_LINE('An error occurred: ' || SQLERRM);
144 RAISE;
145 END update_classes_by_popularity;

```

הרצה: נריץ את הפרוצדורה, נכניס סף פופולריות 12% לדוגמא כלומר כל השיעורים שאחוזי הפופולריות שלהם גדולים מ-12% יורחבו ויעודכנו.

```

1 begin
2     -- Call the procedure
3     update_classes_by_popularity(p_popularity_threshold => :p_popularity_threshold);
4 end;

```

| <input type="checkbox"/> | Variable | Type | Value |
|-------------------------------------|------------------------|-------|-------|
| <input checked="" type="checkbox"/> | p_popularity_threshold | Float | 12 |
| <input checked="" type="checkbox"/> | | | |

1:1 hadasNoa@XE Executed in 0.859 seconds

נקבל הדפסות של כל השיעורים שעודכנו ואיך הם עודכנו.

```

Updated Class: CrossFit (ID: 181)
Old Hall Capacity: 40, New Capacity: 21, Same Hall
-----
Updated Class: Spinning (ID: 147)
Old Hall Capacity: 87, New Capacity: 27, Same Hall |
-----
Updated Class: Body Sculpt (ID: 145)
Old Hall Capacity: 97, New Capacity: 14, Same Hall
-----
Updated Class: Piloxing (ID: 117)
Old Hall Capacity: 96, New Capacity: 31, Same Hall
-----
Updated Class: Zumba (ID: 27)
Old Hall Capacity: 55, New Capacity: 27, Same Hall
-----
Updated Class: Zumba (ID: 156)
Old Hall Capacity: 42, New Capacity: 31, Same Hall
-----
Updated Class: Zumba (ID: 42)
Old Hall Capacity: 27, New Capacity: 32, New Hall: 12
-----
Updated Class: Piloxing (ID: 131)
Old Hall Capacity: 63, New Capacity: 28, Same Hall
-----
Updated Class: Piloxing (ID: 151)
Old Hall Capacity: 96, New Capacity: 24, Same Hall
-----
Updated Class: Yoga (ID: 149)
Old Hall Capacity: 71, New Capacity: 29, Same Hall
-----
Updated Class: Zumba (ID: 35)
Old Hall Capacity: 61, New Capacity: 29, Same Hall
-----
Updated Class: CrossFit (ID: 135)
Old Hall Capacity: 88, New Capacity: 25, Same Hall
-----
Updated Class: Pilates (ID: 191)
Old Hall Capacity: 37, New Capacity: 20, Same Hall
-----
Updated Class: Spinning (ID: 189)
Old Hall Capacity: 51, New Capacity: 26, Same Hall
-----
Skipped Class: Yoga (ID: 174) - No suitable hall found
-----
Updated Class: Dance Cardio (ID: 144)
Old Hall Capacity: 37, New Capacity: 15, Same Hall
-----
Updated Class: CrossFit (ID: 125)
Old Hall Capacity: 37, New Capacity: 13, Same Hall
-----
Updated Class: Bootcamp (ID: 116)
Old Hall Capacity: 93, New Capacity: 19, Same Hall
-----
Updated Class: Pilates (ID: 121)
Old Hall Capacity: 55, New Capacity: 14, Same Hall
-----
Updated Class: Yoga (ID: 113)
Old Hall Capacity: 20, New Capacity: 14, Same Hall
-----
Updated Class: Pilates (ID: 138)
Old Hall Capacity: 91, New Capacity: 16, Same Hall
-----
Updated Class: Pilates (ID: 9)
Old Hall Capacity: 27, New Capacity: 22, Same Hall
-----
Updated Class: Piloxing (ID: 170)
Old Hall Capacity: 46, New Capacity: 17, Same Hall
-----
Updated Class: Body Sculpt (ID: 80)
Old Hall Capacity: 37, New Capacity: 26, Same Hall
-----
Updated Class: HIIT Fit (ID: 2)
Old Hall Capacity: 25, New Capacity: 22, Same Hall
-----
Updated Class: Spinning (ID: 81)
Old Hall Capacity: 67, New Capacity: 31, Same Hall
-----
Updated Class: Pilates (ID: 148)
Old Hall Capacity: 95, New Capacity: 20, Same Hall
-----
Updated Class: Body Sculpt (ID: 73)
Old Hall Capacity: 37, New Capacity: 32, Same Hall
-----
Updated Class: Dance Cardio (ID: 16)
Old Hall Capacity: 37, New Capacity: 37, Same Hall
-----
Updated Class: Bootcamp (ID: 154)
Old Hall Capacity: 72, New Capacity: 17, Same Hall
-----

```

```

-----
Update Summary:
Classes updated: 70
Classes skipped: 4
Total classes processed: 74

```

אפשר לראות לפי ההדפסות **שעבור חלק מהשיעורים** עודכנה רק הקיבולת והם נשארו באותו אולם כי קיבולת האולם הייתה גדולה מספיק, **חלק מהשיעורים** נזקקו גם לאולם חדש כי קיבולת האולם לא הייתה גדולה מספיק **וחלק מהשיעורים** לא נמצא להם אולם חדש. אפשר לראות שמספר השיעורים שעודכן גדול מפני שסף הפופולריות שהכנסנו היה נמוך. סה"כ 70 כיתות עודכנו (לא צולמה כל ההדפסה, היה ארוך מדי..).

בסיס הנתונים לפני:

| START_DATE | CAPACITY | TERMS | CLASS_NAME | CLASS_NUMBER | FINISH_DATE | CLASS_DAY | CLASS_HOUR | PERSON_ID | HALL_NUMBER | GYM_NUMBER |
|---------------|----------|---|---------------|--------------|-------------|-----------|------------|-----------|-------------|------------|
| 1 30/05/2024 | 19 | Age:40+ Gender:female Fitness Level:Intermediate Medical Conditions: n | Body Sculpt | 1 | 11/09/2024 | Tuesday | 16:22 | 32828217 | 38 | 2 |
| 2 01/01/2024 | 39 | Age:40+ Gender: male Fitness Level: Beginner Medical Conditions: no h | Spinning | 12 | 09/06/2024 | Monday | 10:00 | 217841071 | 17 | 18 |
| 3 12/03/2024 | 12 | Age:18-35 Gender:female Fitness Level:Beginner Medical Conditions: n | Pilates | 121 | 05/10/2024 | Monday | 11:21 | 938379550 | 68 | 37 |
| 4 15/01/2024 | 13 | Age:18-35 Gender:female Fitness Level:Advanced Medical Conditions: n | Dance Cardio | 144 | 21/09/2024 | Tuesday | 14:53 | 299858273 | 74 | 24 |
| 5 11/04/2024 | 12 | Age:60+ Gender:female Fitness Level:Advanced Medical Conditions: n | Body Sculpt | 145 | 12/09/2024 | Monday | 17:38 | 330839612 | 4 | 35 |
| 6 06/01/2024 | 20 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | HIT Fit | 2 | 31/08/2024 | Wednesday | 11:00 | 132924806 | 1 | 35 |
| 7 04/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Lift and Tone | 3 | 15/07/2024 | Sunday | 15:00 | 938699949 | 25 | 6 |
| 8 03/01/2024 | 20 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Pilates | 9 | 14/10/2024 | Wednesday | 12:00 | 332700112 | 30 | 17 |
| 9 06/01/2024 | 20 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: no | Dance Cardio | 10 | 19/07/2024 | Saturday | 12:00 | 538284120 | 8 | 46 |
| 10 06/01/2024 | 33 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Dance Cardio | 16 | 05/11/2024 | Wednesday | 14:00 | 537871085 | 27 | 25 |
| 11 03/01/2024 | 23 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | HIT Fit | 20 | 21/07/2024 | Monday | 15:00 | 538284120 | 4 | 35 |
| 12 04/01/2024 | 36 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: no | Zumba | 22 | 01/09/2024 | Thursday | 14:00 | 538284120 | 35 | 30 |
| 13 06/01/2024 | 32 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Dance Cardio | 23 | 07/12/2024 | Tuesday | 10:00 | 338258344 | 22 | 1 |
| 14 01/01/2024 | 20 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Lift and Tone | 25 | 28/12/2024 | Thursday | 15:00 | 538284120 | 23 | 49 |
| 15 04/01/2024 | 24 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Zumba | 27 | 26/12/2024 | Friday | 16:00 | 132924806 | 2 | 6 |
| 16 04/01/2024 | 33 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 33 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 29 | 46 |
| 17 02/01/2024 | 25 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 34 | 21/10/2024 | Monday | 14:00 | 537871085 | 17 | 18 |
| 18 01/01/2024 | 26 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: no | Zumba | 35 | 14/11/2024 | Thursday | 10:00 | 132924806 | 22 | 1 |
| 19 04/01/2024 | 23 | Age: 15-18 Gender: female Fitness Level: Beginner Medical Conditions: r | Dance Cardio | 39 | 10/09/2024 | Friday | 12:00 | 538284120 | 4 | 35 |
| 20 06/01/2024 | 37 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 40 | 29/06/2024 | Tuesday | 10:00 | 132924806 | 8 | 46 |
| 21 01/01/2024 | 29 | Age: 40+ Gender: male Fitness Level: Intermediate Medical Conditions: n | Zumba | 42 | 09/07/2024 | Thursday | 14:00 | 537871085 | 12 | 17 |
| 22 01/01/2024 | 24 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Zumba | 46 | 09/07/2024 | Friday | 14:00 | 132924806 | 6 | 35 |
| 23 03/01/2024 | 34 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Spinning | 47 | 27/09/2024 | Thursday | 12:00 | 538284120 | 17 | 18 |
| 24 02/01/2024 | 20 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Body Sculpt | 49 | 09/06/2024 | Saturday | 15:00 | 217841071 | 4 | 35 |
| 25 01/01/2024 | 30 | Age: 40+ Gender: female Fitness Level: Intermediate Medical Conditions: n | Pilates | 51 | 15/07/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 26 02/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: no | Pilates | 58 | 09/06/2024 | Saturday | 10:00 | 217841071 | 27 | 25 |
| 27 05/01/2024 | 22 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Dance Cardio | 59 | 17/08/2024 | Tuesday | 12:00 | 132924806 | 17 | 18 |
| 28 03/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 66 | 09/06/2024 | Tuesday | 11:00 | 217841071 | 27 | 25 |
| 29 01/01/2024 | 32 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Body Sculpt | 67 | 12/10/2024 | Thursday | 12:00 | 132924806 | 17 | 18 |
| 30 06/01/2024 | 29 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 73 | 09/06/2024 | Thursday | 12:00 | 217841071 | 27 | 25 |
| 31 04/01/2024 | 37 | Age: 18-35 Gender: male Fitness Level: Advanced Medical Conditions: n | Spinning | 74 | 11/11/2024 | Wednesday | 15:00 | 132924806 | 17 | 18 |
| 32 02/01/2024 | 23 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 80 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 27 | 25 |
| 33 06/01/2024 | 28 | Age: 60+ Gender: female Fitness Level: Intermediate Medical Condition | Spinning | 81 | 18/09/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 34 04/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Spinning | 88 | 19/08/2024 | Friday | 11:00 | 132924806 | 17 | 18 |
| 35 05/01/2024 | 37 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 93 | 09/06/2024 | Wednesday | 10:00 | 217841071 | 27 | 25 |
| 36 06/01/2024 | 26 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 94 | 22/08/2024 | Tuesday | 15:00 | 132924806 | 17 | 18 |
| 37 05/01/2024 | 29 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 101 | 23/11/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 38 06/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 107 | 09/06/2024 | Thursday | 10:00 | 217841071 | 27 | 25 |
| 39 04/01/2024 | 26 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 108 | 21/11/2024 | Friday | 11:00 | 132924806 | 17 | 18 |
| 40 12/04/2024 | 12 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions | Yoga | 113 | 23/10/2024 | Thursday | 13:00 | 919189920 | 21 | 51 |
| 41 20/05/2024 | 25 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions | Spinning | 115 | 05/10/2024 | Saturday | 13:00 | 88847666 | 41 | 38 |
| 42 29/02/2024 | 17 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Bootcamp | 116 | 01/10/2024 | Tuesday | 18:00 | 938283896 | 47 | 27 |
| 43 25/03/2024 | 28 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: no | Piloxing | 117 | 28/08/2024 | Thursday | 15:00 | 332700112 | 54 | 40 |

בסיס הנתונים אחר:

| START_DATE | CAPACITY | TERMS | CLASS_NAME | CLASS_NUMBER | FINISH_DATE | CLASS_DAY | CLASS_HOUR | PERSON_ID | HALL_NUMBER | GYM_NUMBER |
|---------------|----------|---|---------------|--------------|-------------|-----------|------------|-----------|-------------|------------|
| 1 30/05/2024 | 21 | Age:40+ Gender:female Fitness Level:Intermediate Medical Conditions: n | Body Sculpt | 1 | 11/09/2024 | Tuesday | 16:22 | 32828217 | 38 | 2 |
| 2 01/01/2024 | 43 | Age:40+ Gender: male Fitness Level: Beginner Medical Conditions: no h | Spinning | 12 | 09/06/2024 | Monday | 10:00 | 217841071 | 17 | 18 |
| 3 12/03/2024 | 14 | Age:18-35 Gender:female Fitness Level:Beginner Medical Conditions: n | Pilates | 121 | 05/10/2024 | Monday | 11:21 | 938379550 | 68 | 37 |
| 4 15/01/2024 | 15 | Age:18-35 Gender:female Fitness Level:Advanced Medical Conditions: n | Dance Cardio | 144 | 21/09/2024 | Tuesday | 14:53 | 299858273 | 74 | 24 |
| 5 11/04/2024 | 14 | Age:60+ Gender:female Fitness Level:Advanced Medical Conditions: n | Body Sculpt | 145 | 12/09/2024 | Monday | 17:38 | 330839612 | 4 | 35 |
| 6 06/01/2024 | 22 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | HIT Fit | 2 | 31/08/2024 | Wednesday | 11:00 | 132924806 | 1 | 35 |
| 7 04/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Lift and Tone | 3 | 15/07/2024 | Sunday | 15:00 | 938699949 | 25 | 6 |
| 8 03/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Pilates | 9 | 14/10/2024 | Wednesday | 12:00 | 332700112 | 30 | 17 |
| 9 06/01/2024 | 22 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: no | Dance Cardio | 10 | 19/07/2024 | Saturday | 12:00 | 538284120 | 8 | 46 |
| 10 06/01/2024 | 37 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Dance Cardio | 16 | 05/11/2024 | Wednesday | 14:00 | 537871085 | 27 | 25 |
| 11 03/01/2024 | 23 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | HIT Fit | 20 | 21/07/2024 | Monday | 15:00 | 538284120 | 4 | 35 |
| 12 04/01/2024 | 36 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: no | Zumba | 22 | 01/09/2024 | Thursday | 14:00 | 538284120 | 35 | 30 |
| 13 06/01/2024 | 32 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Dance Cardio | 23 | 07/12/2024 | Tuesday | 10:00 | 338258344 | 22 | 1 |
| 14 01/01/2024 | 20 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Lift and Tone | 25 | 28/12/2024 | Thursday | 15:00 | 538284120 | 23 | 49 |
| 15 04/01/2024 | 27 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Zumba | 27 | 26/12/2024 | Friday | 16:00 | 132924806 | 2 | 6 |
| 16 04/01/2024 | 33 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 33 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 29 | 46 |
| 17 02/01/2024 | 28 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 34 | 21/10/2024 | Monday | 14:00 | 537871085 | 17 | 18 |
| 18 01/01/2024 | 29 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: no | Zumba | 35 | 14/11/2024 | Thursday | 10:00 | 132924806 | 22 | 1 |
| 19 04/01/2024 | 26 | Age: 15-18 Gender: female Fitness Level: Beginner Medical Conditions: r | Dance Cardio | 39 | 10/09/2024 | Friday | 12:00 | 538284120 | 4 | 35 |
| 20 06/01/2024 | 37 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 40 | 29/06/2024 | Tuesday | 10:00 | 132924806 | 8 | 46 |
| 21 01/01/2024 | 32 | Age: 40+ Gender: male Fitness Level: Intermediate Medical Conditions: n | Zumba | 42 | 09/07/2024 | Thursday | 14:00 | 537871085 | 12 | 17 |
| 22 01/01/2024 | 27 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Zumba | 46 | 09/07/2024 | Friday | 14:00 | 132924806 | 6 | 35 |
| 23 03/01/2024 | 34 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Spinning | 47 | 27/09/2024 | Thursday | 12:00 | 538284120 | 17 | 18 |
| 24 02/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Body Sculpt | 49 | 09/06/2024 | Saturday | 15:00 | 217841071 | 4 | 35 |
| 25 01/01/2024 | 30 | Age: 40+ Gender: female Fitness Level: Intermediate Medical Conditions: n | Pilates | 51 | 15/07/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 26 02/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: no | Pilates | 58 | 09/06/2024 | Saturday | 10:00 | 217841071 | 27 | 25 |
| 27 05/01/2024 | 25 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Dance Cardio | 59 | 17/08/2024 | Tuesday | 12:00 | 132924806 | 17 | 18 |
| 28 03/01/2024 | 35 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: no | Dance Cardio | 66 | 09/06/2024 | Tuesday | 11:00 | 217841071 | 27 | 25 |
| 29 01/01/2024 | 36 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Body Sculpt | 67 | 12/10/2024 | Thursday | 12:00 | 132924806 | 17 | 18 |
| 30 06/01/2024 | 32 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 73 | 09/06/2024 | Thursday | 12:00 | 217841071 | 27 | 25 |
| 31 04/01/2024 | 37 | Age: 18-35 Gender: male Fitness Level: Advanced Medical Conditions: n | Spinning | 74 | 11/11/2024 | Wednesday | 15:00 | 132924806 | 17 | 18 |
| 32 02/01/2024 | 26 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 80 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 27 | 25 |
| 33 06/01/2024 | 31 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Spinning | 81 | 18/09/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 34 04/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: r | Spinning | 88 | 19/08/2024 | Friday | 11:00 | 132924806 | 17 | 18 |
| 35 05/01/2024 | 37 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: no | Body Sculpt | 93 | 09/06/2024 | Wednesday | 10:00 | 217841071 | 27 | 25 |
| 36 06/01/2024 | 26 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 94 | 22/08/2024 | Tuesday | 15:00 | 132924806 | 17 | 18 |
| 37 05/01/2024 | 29 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 101 | 23/11/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 38 06/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 107 | 09/06/2024 | Thursday | 10:00 | 217841071 | 27 | 25 |
| 39 04/01/2024 | 27 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: no | Spinning | 108 | 21/11/2024 | Friday | 11:00 | 132924806 | 17 | 18 |
| 40 12/04/2024 | 14 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions | Yoga | 113 | 23/10/2024 | Thursday | 13:00 | 919189920 | 21 | 51 |
| 41 20/05/2024 | 25 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions | Spinning | 115 | 05/10/2024 | Saturday | 13:00 | 88847666 | 41 | 38 |

אפשר לראות את השינויים בבסיס הנתונים:

דוג ראשונה – שיעור 144, אפשר לראות שהקיבולת שלו גדלה מ13 ל15 והוא נשאר באותו אולם.

דוג שנייה – שיעור 42, אפשר לראות שהקיבולת שלו גדלה מ29 ל32 והוא עבר מאולם 30 לאולם

12. חוץ משתי הדוגמאות המסומנות יש עוד שיעורים רבים שעודכנו בבסיס הנתונים.

פרוצדורה שנייה - swap_devices_for_maintenance

תיאור הפרוצדורה: הפרוצדורה מאפשרת לקבל שני פרמטרים curser של מכשירי כושר או מספר

בודד של מכשיר כושר. אפשרי לספק רק אחד מהם.

פרוצדורה זאת מקבלת מכשיר או רשימה של מכשירים. במקרה של מכשיר אחד לדוג' מכשיר מס 100. היא בודקת האם קיים מכשיר מאותו מודל ואותו חדר כושר שפנוי בשעות ובימים של השיעורים

שבהם משתמשים במכשיר 100, אם נמצא מכשיר פנוי היא מעדכנת את כל השיעורים שמשתמשים

בהם במכשיר 100 להשתמש במכשיר הפנוי במקום. אם היא מקבלת רשימה של מכשירים היא

מבצעת את אותה הפעולה עבור כל מכשיר ברשימה. המטרה היא להחליף מכשיר שצריך תחזוקה

במכשיר פנוי.

הפרוצדורה מדפיסה את כל המכשירים שעודכנו, באיזה מכשיר הם הוחלפו ובכמה שיעורים הם הוחלפו. במקרה שלא נמצא מכשיר פנוי מתאים מודפסת הודעה מתאימה.

קוד הפרוצדורה:

```
1 CREATE OR REPLACE PROCEDURE swap_devices_for_maintenance(  
2     p_devices_cursor IN SYS_REFCURSOR DEFAULT NULL,  
3     p_device_id IN NUMBER DEFAULT NULL  
4 )  
5 AS  
6     v_device_id NUMBER;  
7     v_model VARCHAR2(100);  
8     v_gym_number NUMBER;  
9     v_new_device_id NUMBER;  
10    v_classes_updated NUMBER := 0;  
11    v_total_devices_updated NUMBER := 0;  
12    -- Custom exception  
13    no_available_device EXCEPTION;  
14    -- Cursor to fetch classes using the original device  
15    CURSOR class_cursor(p_device_id NUMBER) IS  
16    SELECT class_number  
17    FROM used_in  
18    WHERE device_number = p_device_id;  
19  
20    PROCEDURE process_single_device(p_device_id IN NUMBER) IS  
21    BEGIN  
22        -- Fetch device details  
23        SELECT device_number, device_model, gym_number  
24        INTO v_device_id, v_model, v_gym_number  
25        FROM device  
26        WHERE device_number = p_device_id;  
27  
28        -- Find an available device of the same model in the same gym  
29        SELECT device_number  
30        INTO v_new_device_id  
31        FROM device d  
32        WHERE d.device_model = v_model  
33        AND d.gym_number = v_gym_number  
34        AND d.device_number != v_device_id  
35        AND NOT EXISTS (  
36            SELECT 1  
37            FROM used_in u  
38            WHERE u.device_number = d.device_number  
39        )  
40        AND ROWNUM = 1;  
41  
42        -- Update all classes to use the new device  
43        v_classes_updated := 0;  
44        FOR class_rec IN class_cursor(v_device_id) LOOP  
45            UPDATE used_in  
46  
47            SET device_number = v_new_device_id  
48            WHERE class_number = class_rec.class_number  
49            AND device_number = v_device_id;  
50            v_classes_updated := v_classes_updated + SQL%ROWCOUNT;  
51        END LOOP;  
52  
53        v_total_devices_updated := v_total_devices_updated + 1;  
54  
55        -- Output results for the device  
56        DBMS_OUTPUT.PUT_LINE('Device swap completed for device ID: ' || v_device_id);  
57        DBMS_OUTPUT.PUT_LINE('New Device ID: ' || v_new_device_id);  
58        DBMS_OUTPUT.PUT_LINE('Number of classes updated: ' || v_classes_updated);  
59        DBMS_OUTPUT.PUT_LINE('-----');  
60  
61        -- Commit the transaction for this device  
62        COMMIT;  
63    EXCEPTION  
64        WHEN NO_DATA_FOUND THEN  
65            DBMS_OUTPUT.PUT_LINE('Error: No available device of the same model found for device ID: ' || v_device_id);  
66        WHEN OTHERS THEN  
67            DBMS_OUTPUT.PUT_LINE('An unexpected error occurred for device ID ' || v_device_id || ': ' || SQLERRM);  
68            -- Rollback changes for this device  
69            ROLLBACK;  
70        END process_single_device;  
71  
72    BEGIN  
73        IF p_devices_cursor IS NOT NULL THEN  
74            -- Process devices from the cursor  
75            LOOP  
76                FETCH p_devices_cursor INTO v_device_id, v_model, v_gym_number;  
77                EXIT WHEN p_devices_cursor%NOTFOUND;  
78                process_single_device(v_device_id);  
79            END LOOP;  
80        ELSIF p_device_id IS NOT NULL THEN  
81            -- Process a single device  
82            process_single_device(p_device_id);  
83        ELSE  
84            -- No input provided  
85            RAISE_APPLICATION_ERROR(-20001, 'Either a cursor or a device ID must be provided.');
```

הרצה: נריץ עם מכשיר מספר 48

```

1 begin
2   -- Call the procedure
3   swap_devices_for_maintenance(p_devices_cursor => :p_devices_cursor,
4                                 p_device_id => :p_device_id);
5 end;

```

| Variable | Type | Value |
|------------------|--------|----------|
| p_devices_cursor | Cursor | <Cursor> |
| p_device_id | Float | 48 |

hadasNoa@XE Executed in 0.64 seconds

ונקבל הדפסה של מס' המכשיר שעודכן, באיזה מס' מכשיר הוא הוחלף וכמה שיעורים עודכנו.

```

Device swap completed for device ID: 48
New Device ID: 24
Number of classes updated: 8
-----

```

בסיס הנתונים אחר:

| | CLASS_NUMBER | DEVICE_NUMBER |
|-----|--------------|---------------|
| 480 | 33 | 18 |
| 325 | 161 | 18 |
| 894 | 165 | 18 |
| 676 | 140 | 18 |
| 437 | 188 | 20 |
| 704 | 118 | 20 |
| 55 | 39 | 22 |
| 784 | 178 | 23 |
| 171 | 121 | 23 |
| 773 | 117 | 23 |
| 722 | 153 | 23 |
| 115 | 80 | 23 |
| 149 | 115 | 23 |
| 287 | 152 | 23 |
| 792 | 2 | 23 |
| 647 | 58 | 23 |
| 349 | 168 | 24 |
| 690 | 81 | 24 |
| 729 | 94 | 24 |
| 788 | 145 | 24 |
| 783 | 29 | 24 |
| 16 | 12 | 24 |
| 345 | 166 | 24 |
| 56 | 39 | 24 |
| 358 | 170 | 25 |
| 822 | 23 | 25 |
| 859 | 129 | 25 |
| 707 | 39 | 25 |
| 513 | 182 | 25 |
| 725 | 168 | 25 |
| 844 | 177 | 25 |
| 624 | 138 | 25 |
| 585 | 59 | 25 |
| 438 | 188 | 25 |
| 913 | 147 | 26 |
| 646 | 33 | 26 |
| 896 | 141 | 26 |
| 328 | 162 | 26 |
| 213 | 132 | 28 |
| 820 | 186 | 28 |
| 879 | 118 | 30 |

בסיס הנתונים לפני:

| | CLASS_NUMBER | DEVICE_NUMBER |
|-----|--------------|---------------|
| 1 | 1 | 36 |
| 636 | 94 | 36 |
| 682 | 159 | 36 |
| 866 | 116 | 36 |
| 851 | 145 | 37 |
| 680 | 168 | 37 |
| 371 | 174 | 37 |
| 576 | 139 | 37 |
| 89 | 59 | 37 |
| 156 | 117 | 38 |
| 348 | 168 | 39 |
| 204 | 130 | 40 |
| 45 | 33 | 40 |
| 408 | 182 | 41 |
| 78 | 49 | 41 |
| 181 | 125 | 42 |
| 165 | 118 | 42 |
| 461 | 159 | 42 |
| 288 | 152 | 43 |
| 656 | 12 | 44 |
| 247 | 143 | 44 |
| 326 | 161 | 44 |
| 626 | 128 | 44 |
| 337 | 165 | 45 |
| 538 | 88 | 47 |
| 205 | 130 | 47 |
| 537 | 12 | 47 |
| 265 | 147 | 47 |
| 258 | 145 | 47 |
| 783 | 29 | 48 |
| 729 | 94 | 48 |
| 16 | 12 | 48 |
| 345 | 166 | 48 |
| 788 | 145 | 48 |
| 56 | 39 | 48 |
| 349 | 168 | 48 |
| 690 | 81 | 48 |
| 150 | 115 | 49 |
| 172 | 121 | 50 |
| 190 | 127 | 50 |
| 48 | 34 | 51 |

אפשר לראות שכל השיעורים שבהם משתמשים במכשיר 48 עודכנו להשתמש במכשיר 24.

תוכניות ראשיות

תוכנית ראשונה - main_class_management

תיאור התוכנית: החלטנו להשתמש בפרוצדורה זאת כדי להפעיל קודם את הפונקציה `evaluate_class_popularity` ואחריה את הפרוצדורה `update_classes_by_popularity`. התוכנית מקבלת פרמטר שהוא סף אחוז הפופולריות. אם לא התקבל הסף היא תחשב אותו ע"י שימוש באחוז הפופולריות הממוצע.

התוכנית קוראת לפונקציה עבור כל שיעור מבסיס הנתונים, מחשבת עבור כל אחד את אחוז הפופולריות שלו ואז מחשבת את אחוז הפופולריות הממוצע לכל השיעורים. אז ע"פ סף אחוז הפופולריות (שהתקבל או חושב) מודפסים כל השיעורים שנחשבים פופולריים (אחוז הפופולריות שלהם גדול מהסף) עם אחוז הפופולריות שלהם והמלצה (להרחבת השיעור וכדו'). אז התוכנית קוראת לפרוצדורה המשנית שאחראית על עדכון השיעורים ושולחת לה את פרמטר הסף (שהתקבל או חושב) כדי לעדכן את כל השיעורים שנחשבים פופולריים. יודפסו כל השיעורים הפופולריים שעודכנו.

קוד התוכנית:

```
1 CREATE OR REPLACE PROCEDURE main_class_management(  
2   p_user_threshold IN NUMBER DEFAULT NULL  
3 ) AS  
4   TYPE class_id_array IS TABLE OF NUMBER;  
5   v_class_ids class_id_array;  
6   v_popularity_threshold NUMBER;  
7   v_evaluation_result class_popularity_result;  
8   v_total_popularity NUMBER := 0;  
9   v_class_count NUMBER := 0;  
10  v_result_cursor SYS_REFCURSOR;  
11 BEGIN  
12   -- Step 1: Fetch all class IDs  
13   SELECT class_number BULK COLLECT INTO v_class_ids  
14   FROM class_lesson  
15   ORDER BY class_number;  
16  
17   -- Step 2: Evaluate all classes and calculate average popularity  
18   DBMS_OUTPUT.PUT_LINE('Evaluating all classes.');
```

```
19   DBMS_OUTPUT.PUT_LINE('-----');  
20   FOR i IN 1..v_class_ids.COUNT LOOP  
21     v_evaluation_result := evaluate_class_popularity(v_class_ids(i), v_result_cursor);  
22     v_total_popularity := v_total_popularity + v_evaluation_result.popularity_rate;  
23     v_class_count := v_class_count + 1;  
24   END LOOP;  
25  
26   -- Calculate threshold  
27   IF p_user_threshold IS NOT NULL THEN  
28     v_popularity_threshold := p_user_threshold;  
29   ELSE  
30     -- Set threshold to average popularity rate + 10%  
31     v_popularity_threshold := (v_total_popularity / v_class_count) + 10;  
32   END IF;  
33   DBMS_OUTPUT.PUT_LINE('Popularity threshold set to: ' || v_popularity_threshold || '%');  
34   DBMS_OUTPUT.PUT_LINE('-----');  
35  
36   -- Step 3: Display popular classes  
37   DBMS_OUTPUT.PUT_LINE('Popular classes:');  
38   DBMS_OUTPUT.PUT_LINE(' ');  
39   FOR i IN 1..v_class_ids.COUNT LOOP  
40     v_evaluation_result := evaluate_class_popularity(v_class_ids(i), v_result_cursor);  
41     IF v_evaluation_result.popularity_rate >= v_popularity_threshold THEN  
42       DBMS_OUTPUT.PUT_LINE('Class Number: ' || v_evaluation_result.class_number ||  
43         ', Popularity Rate: ' || v_evaluation_result.popularity_rate ||  
44         ', Recommendation: ' || v_evaluation_result.recommendation);  
45     END IF;  
46   END LOOP;  
47  
48   -- Step 4: Update popular classes  
49   DBMS_OUTPUT.PUT_LINE('-----');  
50   DBMS_OUTPUT.PUT_LINE('Updating popular classes:');  
51   DBMS_OUTPUT.PUT_LINE(' ');  
52   update_classes_by_popularity(v_popularity_threshold);  
53   DBMS_OUTPUT.PUT_LINE('Class updates completed.');
```

```
54 EXCEPTION  
55 WHEN OTHERS THEN  
56   DBMS_OUTPUT.PUT_LINE('An error occurred in main_class_management: ' || SQLERRM);  
57   RAISE;  
58 END main_class_management;
```

הרצה: נריץ את התוכנית בלי לתת פרמטר סף כדי שהוא יחושב ע"פ ממוצע אחוז הפופולריות.

```
1 begin  
2   -- Call the procedure  
3   main_class_management(p_user_threshold => :p_user_threshold);  
4 end;
```

| | Variable | Type | Value |
|-------------------------------------|------------------|-------|-------|
| <input checked="" type="checkbox"/> | p_user_threshold | Float | |
| <input checked="" type="checkbox"/> | | | |

1:1
0:01
hadasNoa@XE
Executed in 1.016 seconds

נקבל הדפסות:

```

Evaluating all classes.
-----
Popularity threshold set to: 24.7776194855363464869087071081045734623%
-----
Popular classes:
Class Number: 9, Popularity Rate: 28%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 73, Popularity Rate: 25%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 113, Popularity Rate: 31.25%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 116, Popularity Rate: 38.0952380952380952380952380952381%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 121, Popularity Rate: 31.25%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 125, Popularity Rate: 40%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 138, Popularity Rate: 27.77777777777777777777777777778%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 144, Popularity Rate: 58.82352941176470588235294117647058823529%, Recommendation: Moderate popularity. No immediate action required.
Class Number: 148, Popularity Rate: 25%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
Class Number: 170, Popularity Rate: 26.31578947368421052631578947368421052632%, Recommendation: Low popularity. Consider marketing or schedule adjustments.
-----
Updating popular classes:
Updated Class: Dance Cardio (ID: 144)
Old Hall Capacity: 37, New Capacity: 19, Same Hall
-----
Updated Class: CrossFit (ID: 125)
Old Hall Capacity: 37, New Capacity: 17, Same Hall
-----
Updated Class: Bootcamp (ID: 116)
Old Hall Capacity: 93, New Capacity: 24, Same Hall
-----
Updated Class: Pilates (ID: 121)
Old Hall Capacity: 55, New Capacity: 18, Same Hall
-----
Updated Class: Yoga (ID: 113)
Old Hall Capacity: 20, New Capacity: 18, Same Hall
-----
Updated Class: Pilates (ID: 9)
Old Hall Capacity: 27, New Capacity: 28, New Hall: 12
-----
Updated Class: Pilates (ID: 138)
Old Hall Capacity: 91, New Capacity: 20, Same Hall
-----
Updated Class: Piloxing (ID: 170)
Old Hall Capacity: 46, New Capacity: 21, Same Hall
-----

Updated Class: Pilates (ID: 148)
Old Hall Capacity: 95, New Capacity: 22, Same Hall
-----
Updated Class: Body Sculpt (ID: 73)
Old Hall Capacity: 37, New Capacity: 36, Same Hall
-----

Update Summary:
Classes updated: 10
Classes skipped: 0
Total classes processed: 10
Class updates completed.

```

אפשר לראות בהתחלה שנעשה חישוב פופולריות עבור כל השיעורים, נקבע הסף ע"פ ממוצע אחוז הפופולריות ואז את כל השיעורים שנחשבים פופולריים (ביחס לכל שאר השיעורים כמובן הם הכי גבוהים). אח"כ ניתן לראות את העדכון של כל השיעורים הפופולריים – הגדלת הקיבולת והתאמת אולם חדש אם צריך . בסוף ניתן לראות סיכום שבו 10 כיתות עודכנו והתהליך כולו נגמר.

בסיס הנתונים לפני:

| START_DATE | CAPACITY | TERMS | CLASS_NAME | CLASS_NUMBER | FINISH_DATE | CLASS_DAY | CLASS_HOUR | PERSON_ID | HALL_NUMBER | GYM_NUMBER |
|------------|----------|---|---------------|--------------|-------------|-----------|------------|-----------|-------------|------------|
| 30/05/2024 | 21 | Age40+ Gender:female Fitness Level:Intermediate Medical Conditions:n | Body Sculpt | 1 | 11/09/2024 | Tuesday | 16:22 | 328828217 | 38 | 2 |
| 06/01/2024 | 25 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | HIT Fit | 2 | 31/08/2024 | Wednesday | 11:00 | 132924806 | 1 | 35 |
| 04/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Lift and Tone | 3 | 15/07/2024 | Sunday | 15:00 | 638066940 | 35 | 4 |
| 03/01/2024 | 25 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Pilates | 9 | 14/10/2024 | Wednesday | 12:00 | 332700112 | 30 | 17 |
| 06/01/2024 | 22 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 10 | 19/07/2024 | Saturday | 12:00 | 538284120 | 6 | 46 |
| 21/01/2024 | 43 | Age: 40+ Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 12 | 09/06/2024 | Monday | 10:00 | 217841071 | 17 | 18 |
| 06/01/2024 | 37 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Dance Cardio | 16 | 05/11/2024 | Wednesday | 14:00 | 537871085 | 27 | 25 |
| 03/01/2024 | 23 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | HIT Fit | 20 | 21/07/2024 | Monday | 15:00 | 538284120 | 4 | 35 |
| 04/01/2024 | 36 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Zumba | 22 | 01/09/2024 | Thursday | 14:00 | 538284120 | 35 | 30 |
| 06/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Dance Cardio | 23 | 07/12/2024 | Tuesday | 10:00 | 338258344 | 22 | 1 |
| 01/01/2024 | 22 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Lift and Tone | 25 | 28/12/2024 | Thursday | 15:00 | 538284120 | 23 | 49 |
| 04/01/2024 | 27 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Zumba | 27 | 26/12/2024 | Friday | 16:00 | 132924806 | 2 | 6 |
| 01/02/2024 | 10 | Age40+ Gender:female Fitness Level:Intermediate Medical Conditions:n | Body Sculpt | 29 | 07/06/2024 | Tuesday | 16:22 | 328828217 | 38 | 2 |
| 06/01/2024 | 10 | Age40+ Gender:female Fitness Level:Intermediate Medical Conditions:n | Body Sculpt | 32 | 01/06/2024 | Tuesday | 16:22 | 328828217 | 38 | 2 |
| 04/01/2024 | 33 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 33 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 29 | 46 |
| 07/01/2024 | 28 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 34 | 21/10/2024 | Monday | 14:00 | 537871085 | 17 | 18 |
| 01/01/2024 | 29 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Zumba | 35 | 14/11/2024 | Thursday | 10:00 | 132924806 | 22 | 1 |
| 04/01/2024 | 26 | Age: 15-18 Gender: female Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 39 | 10/09/2024 | Friday | 12:00 | 538284120 | 4 | 35 |
| 06/01/2024 | 37 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 40 | 29/06/2024 | Tuesday | 10:00 | 132924806 | 8 | 46 |
| 01/01/2024 | 32 | Age: 40+ Gender: male Fitness Level: Intermediate Medical Conditions: n | Zumba | 42 | 07/07/2024 | Thursday | 14:00 | 537871085 | 12 | 17 |
| 01/01/2024 | 27 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Zumba | 46 | 09/07/2024 | Friday | 14:00 | 132924806 | 6 | 35 |
| 03/01/2024 | 34 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Spinning | 47 | 27/09/2024 | Thursday | 12:00 | 538284120 | 9 | 37 |
| 02/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 49 | 09/06/2024 | Saturday | 15:00 | 217841071 | 4 | 35 |
| 01/01/2024 | 30 | Age: 40+ Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 51 | 15/07/2024 | Tuesday | 10:00 | 132924806 | 4 | 18 |
| 02/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Pilates | 58 | 09/06/2024 | Saturday | 10:00 | 217841071 | 27 | 25 |
| 07/01/2024 | 25 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 59 | 17/08/2024 | Tuesday | 12:00 | 132924806 | 17 | 18 |
| 03/01/2024 | 35 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 66 | 09/06/2024 | Tuesday | 11:00 | 217841071 | 27 | 25 |
| 01/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 69 | 13/10/2024 | Thursday | 14:00 | 537871085 | 17 | 18 |
| 06/01/2024 | 32 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 73 | 09/06/2024 | Thursday | 12:00 | 217841071 | 27 | 25 |
| 04/01/2024 | 37 | Age: 18-35 Gender: male Fitness Level: Intermediate Medical Conditions: n | Spinning | 74 | 11/11/2024 | Wednesday | 13:00 | 132924806 | 17 | 18 |
| 02/01/2024 | 29 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 80 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 27 | 25 |
| 06/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Spinning | 81 | 18/09/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 04/01/2024 | 34 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Spinning | 88 | 19/08/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 05/01/2024 | 37 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 93 | 09/06/2024 | Wednesday | 10:00 | 217841071 | 27 | 25 |
| 06/01/2024 | 26 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 94 | 22/08/2024 | Tuesday | 15:00 | 132924806 | 17 | 18 |
| 07/01/2024 | 29 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 101 | 23/11/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 06/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 107 | 09/06/2024 | Thursday | 10:00 | 217841071 | 27 | 25 |
| 04/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Conditions: n | Spinning | 108 | 24/11/2024 | Friday | 14:00 | 132924806 | 17 | 18 |
| 01/01/2024 | 16 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions: n | Yoga | 113 | 23/10/2024 | Thursday | 13:00 | 919189920 | 21 | 51 |
| 02/01/2024 | 21 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Bootcamp | 116 | 01/10/2024 | Tuesday | 18:00 | 936296296 | 47 | 27 |
| 23/03/2024 | 31 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Piloxing | 117 | 28/08/2024 | Thursday | 15:00 | 332700112 | 34 | 40 |
| 10/05/2024 | 20 | Age: 60+ Gender: male Fitness Level: Intermediate Medical Conditions: n | Yoga | 118 | 09/06/2024 | Sunday | 15:00 | 621394627 | 18 | 44 |

בסיס הנתונים אחר:

| START_DATE | CAPACITY | TERMS | CLASS_NAME | CLASS_NUMBER | FINISH_DATE | CLASS_DAY | CLASS_HOUR | PERSON_ID | HALL_NUMBER | GYM_NUMBER |
|------------|----------|---|---------------|--------------|-------------|-----------|------------|-----------|-------------|------------|
| 30/05/2024 | 21 | Age40+ Gender:female Fitness Level:Intermediate Medical Conditions:n | Body Sculpt | 1 | 11/09/2024 | Tuesday | 16:22 | 328828217 | 38 | 2 |
| 01/01/2024 | 43 | Age: 40+ Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 12 | 09/06/2024 | Monday | 10:00 | 217841071 | 17 | 18 |
| 12/03/2024 | 19 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Pilates | 121 | 05/10/2024 | Monday | 11:21 | 638066940 | 6 | 37 |
| 15/01/2024 | 14 | Age18-35 Gender:female Fitness Level:Advanced Medical Conditions:n | Dance Cardio | 144 | 21/09/2024 | Tuesday | 14:53 | 299595973 | 74 | 24 |
| 11/04/2024 | 14 | Age60+ Gender:female Fitness Level:Advanced Medical Conditions:n | Body Sculpt | 145 | 12/09/2024 | Monday | 17:38 | 330839612 | 4 | 35 |
| 06/01/2024 | 25 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | HIT Fit | 2 | 31/08/2024 | Wednesday | 11:00 | 132924806 | 1 | 35 |
| 04/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Lift and Tone | 3 | 15/07/2024 | Sunday | 15:00 | 638066940 | 35 | 4 |
| 03/01/2024 | 28 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Pilates | 9 | 14/10/2024 | Wednesday | 12:00 | 332700112 | 30 | 17 |
| 06/01/2024 | 22 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 10 | 19/07/2024 | Saturday | 12:00 | 538284120 | 6 | 46 |
| 06/01/2024 | 37 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Dance Cardio | 16 | 05/11/2024 | Wednesday | 14:00 | 537871085 | 27 | 25 |
| 03/01/2024 | 23 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | HIT Fit | 20 | 21/07/2024 | Monday | 15:00 | 538284120 | 4 | 35 |
| 04/01/2024 | 36 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Zumba | 22 | 01/09/2024 | Thursday | 14:00 | 538284120 | 35 | 30 |
| 06/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Dance Cardio | 23 | 07/12/2024 | Tuesday | 10:00 | 338258344 | 22 | 1 |
| 01/01/2024 | 22 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Lift and Tone | 25 | 28/12/2024 | Thursday | 15:00 | 538284120 | 23 | 49 |
| 04/01/2024 | 27 | Age: 15-18 Gender: female Fitness Level: Intermediate Medical Condition | Zumba | 27 | 26/12/2024 | Friday | 16:00 | 132924806 | 2 | 6 |
| 04/01/2024 | 33 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 33 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 29 | 46 |
| 02/01/2024 | 28 | Age: 15-18 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 34 | 21/10/2024 | Monday | 14:00 | 537871085 | 17 | 18 |
| 18/01/2024 | 29 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Zumba | 35 | 14/11/2024 | Thursday | 10:00 | 132924806 | 22 | 1 |
| 04/01/2024 | 26 | Age: 15-18 Gender: female Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 39 | 10/09/2024 | Friday | 12:00 | 538284120 | 4 | 35 |
| 06/01/2024 | 37 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 40 | 29/06/2024 | Tuesday | 10:00 | 132924806 | 8 | 46 |
| 01/01/2024 | 32 | Age: 40+ Gender: male Fitness Level: Intermediate Medical Conditions: n | Zumba | 42 | 07/07/2024 | Thursday | 14:00 | 537871085 | 12 | 17 |
| 01/01/2024 | 27 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Zumba | 46 | 09/07/2024 | Friday | 14:00 | 132924806 | 6 | 35 |
| 03/01/2024 | 34 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Spinning | 47 | 27/09/2024 | Thursday | 12:00 | 538284120 | 17 | 18 |
| 02/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Body Sculpt | 49 | 09/06/2024 | Saturday | 15:00 | 217841071 | 4 | 35 |
| 01/01/2024 | 30 | Age: 40+ Gender: female Fitness Level: Intermediate Medical Condition | Pilates | 51 | 15/07/2024 | Tuesday | 10:00 | 132924806 | 4 | 18 |
| 02/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Pilates | 58 | 09/06/2024 | Saturday | 10:00 | 217841071 | 27 | 25 |
| 07/01/2024 | 25 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 59 | 17/08/2024 | Tuesday | 12:00 | 132924806 | 17 | 18 |
| 03/01/2024 | 35 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Dance Cardio | 66 | 09/06/2024 | Tuesday | 11:00 | 217841071 | 27 | 25 |
| 01/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Conditions: n | Body Sculpt | 69 | 13/10/2024 | Thursday | 14:00 | 537871085 | 17 | 18 |
| 06/01/2024 | 32 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 73 | 09/06/2024 | Thursday | 12:00 | 217841071 | 27 | 25 |
| 04/01/2024 | 37 | Age: 18-35 Gender: male Fitness Level: Intermediate Medical Conditions: n | Spinning | 74 | 11/11/2024 | Wednesday | 13:00 | 132924806 | 17 | 18 |
| 02/01/2024 | 29 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 80 | 09/06/2024 | Tuesday | 15:00 | 217841071 | 27 | 25 |
| 06/01/2024 | 35 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Condition | Spinning | 81 | 18/09/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 04/01/2024 | 22 | Age: 18-35 Gender: female Fitness Level: Beginner Medical Conditions: n | Spinning | 88 | 19/08/2024 | Monday | 11:00 | 132924806 | 17 | 18 |
| 05/01/2024 | 37 | Age: 60+ Gender: male Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 93 | 09/06/2024 | Wednesday | 10:00 | 217841071 | 27 | 25 |
| 06/01/2024 | 26 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 94 | 22/08/2024 | Tuesday | 15:00 | 132924806 | 17 | 18 |
| 07/01/2024 | 29 | Age: 18-35 Gender: male Fitness Level: Beginner Medical Conditions: n | Spinning | 101 | 23/11/2024 | Tuesday | 10:00 | 132924806 | 17 | 18 |
| 06/01/2024 | 37 | Age: 60+ Gender: female Fitness Level: Advanced Medical Conditions: n | Body Sculpt | 107 | 09/06/2024 | Thursday | 10:00 | 217841071 | 27 | 25 |
| 04/01/2024 | 36 | Age: 18-35 Gender: female Fitness Level: Intermediate Medical Conditions: n | Spinning | 108 | 24/11/2024 | Friday | 14:00 | 132924806 | 17 | 18 |
| 02/01/2024 | 16 | Age: 15-18 Gender: male Fitness Level: Intermediate Medical Conditions: n | Yoga | 113 | 23/10/2024 | Thursday | 13:00 | 919189920 | 21 | 51 |
| 02/01/2024 | 24 | Age: 18-35 Gender: female Fitness Level: Advanced Medical Conditions: n | Bootcamp | 116 | 01/10/2024 | Tuesday | 18:00 | 936296296 | 47 | 27 |
| 23/03/2024 | 31 | Age: 60+ Gender: female Fitness Level: Beginner Medical Conditions: n | Piloxing | 117 | 28/08/2024 | Thursday | 15:00 | 332700112 | 34 | 40 |

אפשר לראות בשיעורים המסומנים איך הקיבולת שלהם גדלה ובחלק מס' האולם השתנה.

תוכנית שניה - main_maintenance_process

תיאור התוכנית: החלטנו להשתמש בפרוצדורה זאת כדי להפעיל קודם את הפונקציה

get_all_devices_maintenance ואחריה את הפרוצדורה swap_devices_for_maintenance.

הפרוצדורה לא מקבלת פרמטרים.

התוכנית קוראת לפונקציה ומקבלת ממנה cursor שבו יש את כל המכשירים, עם הפרטים שלהם,

מס השיעורים בהם משתמשים בכל אחד, סוג התחזוקה שנצרך עבור כל אחד מהם וכן תאריך

התחזוקה (תלוי בסוג התחזוקה הנצרך). אז היא מדפיסה את כל המכשירים שצריכים תחזוקה מסוג

full service – מכשירים שמתשמשים בהם ביותר מ-15 שיעורים או מסוג Inspection – מכשירים

שמתשמשים בהם בין 8 ל-15 שיעורים. את כל המכשירים האלו היא מכניסה לתוך cursor חדש

שאותו היא שולחת לפרוצדורה המשנית שעבור כל אחד מהם היא בודקת האם קיים מכשיר מאותו

מודל ואותו חדר כושר שפנוי בשעות ובימים של השיעורים שבהם משתמשים במכשיר, אם נמצא

מכשיר פנוי היא מעדכנת את כל השיעורים שמשתמשים בהם במכשיר הזה להשתמש במכשיר הפנוי במקום. המטרה היא להחליף מכשיר שצריך תחזוקה במכשיר פנוי. הפרוצדורה המשנית גם מדפיסה את כל המכשירים שעודכנו, באיזה מכשיר הם הוחלפו ובכמה שיעורים הם הוחלפו. במקרה שלא נמצא מכשיר פנוי מתאים מודפסת הודעה מתאימה.

קוד התוכנית:

```
1 CREATE OR REPLACE PROCEDURE main_maintenance_process
2 AS
3     v_devices_cursor SYS_REFCURSOR;
4     v_device_number NUMBER;
5     v_device_model VARCHAR2(100);
6     v_hall_number NUMBER;
7     v_gym_number NUMBER;
8     v_gym_name VARCHAR2(100);
9     v_usage_count NUMBER;
10    v_maintenance_type VARCHAR2(20);
11    v_maintenance_date DATE;
12
13    v_devices_to_swap SYS_REFCURSOR;
14    v_devices_swapped NUMBER := 0;
15    v_total_devices NUMBER := 0;
16 BEGIN
17     -- Get all devices needing maintenance
18     v_devices_cursor := get_all_devices_maintenance();
19
20     DBMS_OUTPUT.PUT_LINE('Devices needing maintenance:');
21     DBMS_OUTPUT.PUT_LINE('-----');
22
23     -- First pass: Print maintenance information and count devices to swap
24     LOOP
25         FETCH v_devices_cursor INTO
26             v_device_number, v_device_model, v_hall_number, v_gym_number,
27             v_gym_name, v_usage_count, v_maintenance_type, v_maintenance_date;
28         EXIT WHEN v_devices_cursor%NOTFOUND;
29
30         v_total_devices := v_total_devices + 1;
31
32         IF v_maintenance_type IN ('Full Service', 'Inspection') THEN
33             DBMS_OUTPUT.PUT_LINE('Device: ' || v_device_number ||
34                                   ', Model: ' || v_device_model ||
35                                   ', Gym: ' || v_gym_name ||
36                                   ', Maintenance: ' || v_maintenance_type ||
37                                   ', Date: ' || TO_CHAR(v_maintenance_date, 'YYYY-MM-DD'));
38             v_devices_swapped := v_devices_swapped + 1;
39         END IF;
40     END LOOP;
41
42     DBMS_OUTPUT.PUT_LINE('-----');
43     DBMS_OUTPUT.PUT_LINE('Total devices: ' || v_total_devices);
44     DBMS_OUTPUT.PUT_LINE('Devices to swap: ' || v_devices_swapped);
45     DBMS_OUTPUT.PUT_LINE('');
46
47     -- Close and reopen the cursor for the second pass
48     CLOSE v_devices_cursor;
49     v_devices_cursor := get_all_devices_maintenance();
50
51     -- Second pass: Perform device swaps
52     DBMS_OUTPUT.PUT_LINE('Performing device swaps:');
53     DBMS_OUTPUT.PUT_LINE('-----');
54
55     LOOP
56         FETCH v_devices_cursor INTO
57             v_device_number, v_device_model, v_hall_number, v_gym_number,
58             v_gym_name, v_usage_count, v_maintenance_type, v_maintenance_date;
59         EXIT WHEN v_devices_cursor%NOTFOUND;
60
61         IF v_maintenance_type IN ('Full Service', 'Inspection') THEN
62             -- Create a cursor for this specific device
63             OPEN v_devices_to_swap FOR
64                 SELECT v_device_number AS device_number,
65                        v_device_model AS device_model,
66                        v_gym_number AS gym_number
67                 FROM DUAL;
68
69             -- Swap this device
70             swap_devices_for_maintenance(v_devices_to_swap);
71
72             CLOSE v_devices_to_swap;
73         END IF;
74     END LOOP;
75
76     -- Close the main cursor
77     CLOSE v_devices_cursor;
78
79     DBMS_OUTPUT.PUT_LINE('-----');
80     DBMS_OUTPUT.PUT_LINE('Maintenance process completed.');
```

```
81
82 EXCEPTION
83 WHEN OTHERS THEN
84     DBMS_OUTPUT.PUT_LINE('An error occurred in main_maintenance_process: ' || SQLERRM);
85     -- Close cursors if they are open
86     IF v_devices_cursor%ISOPEN THEN
87         CLOSE v_devices_cursor;
88     END IF;
89     IF v_devices_to_swap%ISOPEN THEN
90         CLOSE v_devices_to_swap;
91     END IF;
92     RAISE;
93 END main_maintenance_process;
```

הרצה: נריץ את התוכנית (לא מקבלת שום פרמטר)

| | Variable | Type | Value |
|---|-------------------------------------|------|-------|
| * | <input checked="" type="checkbox"/> | | |

4:5 ▼ hadasNoa@XE Executed in 0.953 seconds

```

-----
Device: 68, Model: Spinning Bike, Gym: Health Hub, Maintenance: Inspection, Date: 2024-07-15
Device: 103, Model: Treadmill, Gym: Flex Gym, Maintenance: Inspection, Date: 2024-07-15
Device: 13, Model: Treadmill, Gym: Power Performance, Maintenance: Inspection, Date: 2024-07-15
Device: 88, Model: Dumbbells, Gym: Fit Factory, Maintenance: Inspection, Date: 2024-07-15
Device: 314, Model: Spinning Bike, Gym: Shape Up, Maintenance: Inspection, Date: 2024-07-15
Device: 389, Model: Weight Plates, Gym: Health Hub, Maintenance: Inspection, Date: 2024-07-15
Device: 4, Model: Dumbbells, Gym: The Fit Stop, Maintenance: Inspection, Date: 2024-07-15
Device: 24, Model: Stepmills, Gym: Total Body Gym, Maintenance: Inspection, Date: 2024-07-15
Device: 25, Model: Treadmill, Gym: Fit Body Gym, Maintenance: Inspection, Date: 2024-07-15
Device: 335, Model: Weight Plates, Gym: The Fit Stop, Maintenance: Inspection, Date: 2024-07-15
Device: 67, Model: Treadmill, Gym: Fit & Fine, Maintenance: Inspection, Date: 2024-07-15
Device: 107, Model: Weight Plates, Gym: Strength Haven, Maintenance: Inspection, Date: 2024-07-15
Device: 305, Model: Weight Plates, Gym: Elite Fitness, Maintenance: Inspection, Date: 2024-07-15
Device: 365, Model: Weight Plates, Gym: Elite Fitness, Maintenance: Inspection, Date: 2024-07-15
Device: 8, Model: Spinning Bike, Gym: Endurance Edge, Maintenance: Inspection, Date: 2024-07-15
Device: 119, Model: Weight Plates, Gym: Muscle Matters, Maintenance: Inspection, Date: 2024-07-15
Device: 156, Model: Stepmills, Gym: Strength Station, Maintenance: Inspection, Date: 2024-07-15
Device: 324, Model: Stepmills, Gym: Fitness Zone, Maintenance: Inspection, Date: 2024-07-15
Device: 354, Model: Spinning Bike, Gym: Strength Station, Maintenance: Inspection, Date: 2024-07-15
-----
Total devices: 420
Devices to swap: 19

Performing device swaps:
-----
Device swap completed for device ID: 68
New Device ID: 92
Number of classes updated: 14
-----
Device swap completed for device ID: 103
New Device ID: 55
Number of classes updated: 8
-----
Device swap completed for device ID: 13
New Device ID: 85
Number of classes updated: 11
-----
Device swap completed for device ID: 88
New Device ID: 160
Number of classes updated: 10
-----
Error: No available device of the same model found for device ID: 314
Error: No available device of the same model found for device ID: 389
Error: No available device of the same model found for device ID: 4
Device swap completed for device ID: 24
New Device ID: 48
Number of classes updated: 8
-----
Device swap completed for device ID: 25
New Device ID: 97
Number of classes updated: 10
-----
Device swap completed for device ID: 335
New Device ID: 345
Number of classes updated: 11
-----
Device swap completed for device ID: 67
New Device ID: 91
Number of classes updated: 8
-----
Device swap completed for device ID: 107
New Device ID: 11
Number of classes updated: 10
-----
Error: No available device of the same model found for device ID: 305
Error: No available device of the same model found for device ID: 365
Device swap completed for device ID: 8
New Device ID: 56
Number of classes updated: 8
-----
Device swap completed for device ID: 119
New Device ID: 47
Number of classes updated: 9
-----
Device swap completed for device ID: 156
New Device ID: 60
Number of classes updated: 11
-----
Error: No available device of the same model found for device ID: 324
Error: No available device of the same model found for device ID: 354
-----
Maintenance process completed.

```


אפשר לראות בהתחלה שאחרי סיווג כל המכשירים לסוג התחזוקה שהם צריכים, המכשירים מסוג inspection ו full service הופדו כלומר מתוך 420 מכשירים בבסיס הנתונים 19 זקוקים לתחזוקה דחופה. אח"כ התבצעו החלפות עבור כל אחד מהמכשירים האלו, אם נמצא מכשיר פנוי השיעורים שהשתמשו באותו מכשיר עודכנו להשתמש במכשיר הפנוי והודפסה הודעה עם פרטי ההחלפה. אם לא נמצא מכשיר פנוי לא עודכן בסיס הנתונים והודפסה הודעה מתאימה.

בסיס הנתונים אחרי:

| | CLASS_NUMBER | DEVICE_NUMBER |
|-----|--------------|---------------|
| 521 | 173 | 1 |
| 70 | 47 | 1 |
| 814 | 118 | 4 |
| 327 | 162 | 4 |
| 920 | 119 | 4 |
| 180 | 123 | 4 |
| 42 | 27 | 4 |
| 458 | 188 | 4 |
| 706 | 59 | 4 |
| 447 | 191 | 4 |
| 681 | 5000 | 5 |
| 832 | 101 | 5 |
| 484 | 128 | 55 |
| 277 | 149 | 56 |
| 419 | 184 | 56 |
| 862 | 143 | 56 |
| 170 | 119 | 56 |
| 831 | 174 | 56 |
| 21 | 16 | 56 |
| 534 | 73 | 56 |
| 522 | 127 | 56 |
| 273 | 148 | 57 |
| 830 | 107 | 57 |
| 319 | 160 | 57 |

בסיס הנתונים לפני:

| | CLASS_NUMBER | DEVICE_NUMBER |
|-----|--------------|---------------|
| 70 | 47 | 1 |
| 521 | 173 | 1 |
| 920 | 119 | 4 |
| 706 | 59 | 4 |
| 42 | 27 | 4 |
| 180 | 123 | 4 |
| 814 | 118 | 4 |
| 327 | 162 | 4 |
| 447 | 191 | 4 |
| 458 | 188 | 4 |
| 294 | 153 | 5 |
| 99 | 66 | 5 |
| 832 | 101 | 5 |
| 921 | 164 | 5 |
| 681 | 5000 | 5 |
| 756 | 39 | 5 |
| 353 | 169 | 6 |
| 607 | 126 | 6 |
| 122 | 81 | 6 |
| 665 | 32 | 7 |
| 88 | 59 | 7 |
| 862 | 143 | 8 |
| 534 | 73 | 8 |
| 522 | 127 | 8 |
| 831 | 174 | 8 |
| 21 | 16 | 8 |
| 170 | 119 | 8 |
| 419 | 184 | 8 |
| 277 | 149 | 8 |
| 433 | 187 | 9 |
| 114 | 80 | 10 |
| 612 | 49 | 12 |
| 140 | 108 | 12 |
| 664 | 186 | 12 |
| 187 | 126 | 12 |
| 517 | 157 | 12 |
| 295 | 153 | 12 |
| 823 | 121 | 13 |
| 738 | 23 | 13 |
| 106 | 67 | 13 |
| 809 | 115 | 13 |

אפשר לראות לפי ההדפסות שמכשיר מס' 4 צריך היה לעבור עדכון אבל לא נמצא מכשיר פנוי עבורו לכן כל השיעורים שהשתמשו בו לפני הרצת הפרוצדורה עדיין משתמשים בו – לא השתנו. לעומת זאת מכשיר מס' 8 צריך לעבור עדכון ואכן עבר עדכון אפשר לראות שכל השיעורים שהשתמשו בו לפני הפעלת הפרוצדורה משתמשים במכשיר מס' 56 במקום.