To explain how the **"cumulativeBucketAvg"** is generated step by step and how it relates to **week** and **bucket numbers**, let’s break it down in an easy way and focus on how the buckets are set in relation to the **SCE.StartDate** (student's course enrollment start date).

**Step-by-Step Breakdown:**

**1. Buckets Are Based on Weeks Since the SCE.StartDate:**

* The **bucket numbers** represent **groups of weeks** that are calculated from the **SCE.StartDate** (the student's course enrollment start date).
* Each bucket corresponds to a specific range of weeks. For example:
  + **Bucket 3** might represent **Weeks 1-3** from the student’s start date.
  + **Bucket 6** might represent **Weeks 4-6**, and so on.
* The DATEDIFF(WEEK, SCE.StartDate, Attend.AttendanceDate) function calculates how many weeks have passed between the **SCE.StartDate** and the **AttendanceDate** for each student.

**2. How Buckets Are Defined:**

* In the SQL query, buckets are set in ranges of weeks. For instance:

sql

Copy code

CASE

WHEN DATEDIFF(WEEK, SCE.StartDate, AttendanceDate) < 4 THEN 3

WHEN DATEDIFF(WEEK, SCE.StartDate, AttendanceDate) BETWEEN 4 AND 6 THEN 6

WHEN DATEDIFF(WEEK, SCE.StartDate, AttendanceDate) BETWEEN 7 AND 9 THEN 9

-- Other bucket ranges here

* The logic breaks down weeks into specific ranges and assigns them a **bucket number**:
  + Bucket 3: Weeks 1-3
  + Bucket 6: Weeks 4-6
  + Bucket 9: Weeks 7-9
  + ...and so on, up to week 53.
* Each week a student attends is grouped into one of these buckets.

**3. Attendance Percent Per Week:**

* For each week, attendance is tracked as a **percentage**:
  + **100%** if the student attended and swiped in.
  + **0%** if they missed the session or didn’t swipe in.

Example:

* If a student attended all sessions in Weeks 1-3 (Bucket 3), they would have **100% attendance** for that period.
* If they attended only 1 out of 3 sessions in Weeks 1-3, their attendance for Bucket 3 would be **33.33%**.

**4. Cumulative Average (cumulativeBucketAvg):**

* The **cumulativeBucketAvg** is the **average attendance percentage** calculated **cumulatively for each bucket**.
* This means it’s an **average of the attendance percentages for all weeks up to the current bucket**.

Example:

* **Bucket 3 (Weeks 1-3)**:
  + Attendance Week 1: 100%
  + Attendance Week 2: 50%
  + Attendance Week 3: 100%
  + **Bucket 3 cumulative average** = (100% + 50% + 100%) / 3 = **83.33%**
* **Bucket 6 (Weeks 4-6)**:
  + Attendance Week 4: 0%
  + Attendance Week 5: 100%
  + Attendance Week 6: 50%
  + **Bucket 6 cumulative average** = (0% + 100% + 50%) / 3 = **50%**
  + The **overall cumulative average** now includes Bucket 3 and Bucket 6.

**5. How It Relates to SCE.StartDate:**

* The **SCE.StartDate** is critical because it marks the beginning of when the student started their course. All attendance tracking, bucket assignments, and cumulative averages are based on the number of weeks passed since this start date.
* The buckets are calculated as the number of weeks after the **SCE.StartDate**:

sql

Copy code

DATEDIFF(WEEK, SCE.StartDate, AttendanceDate)

This determines how far the student is into their course, and which bucket their attendance is placed in.

**6. Putting It All Together:**

* **Weeks** are grouped into **buckets** based on how many weeks have passed since the **SCE.StartDate**.
* Attendance is tracked **week by week**, and a percentage is calculated based on whether the student attended or not.
* The **cumulativeBucketAvg** is the running average of attendance across all buckets up to the current one, providing a snapshot of the student’s performance over time.

**Example:**

1. **Student A’s Timeline**:
   * Start Date: September 1st, 2022.
   * **Bucket 3 (Weeks 1-3)**:
     + Attended Week 1: 100%
     + Missed Week 2: 0%
     + Attended Week 3: 100%
     + **Bucket 3 average**: (100% + 0% + 100%) / 3 = 66.67%
   * **Bucket 6 (Weeks 4-6)**:
     + Missed Week 4: 0%
     + Attended Week 5: 100%
     + Missed Week 6: 0%
     + **Bucket 6 average**: (0% + 100% + 0%) / 3 = 33.33%
   * **Cumulative Average by Bucket 6**: This would average attendance for both **Bucket 3** and **Bucket 6**.

**Summary:**

* **Buckets** are calculated based on how many weeks have passed since the student’s **SCE.StartDate**.
* Attendance is tracked for each week within these buckets.
* The **cumulativeBucketAvg** gives a running average of the student's attendance percentage across all buckets (groups of weeks), showing how they performed in attendance up to that point in time.