The Exponentially Weighted Moving Average (EWMA) equation, when using $v_t$ for the moving average and $B$ as the smoothing factor, is:

$$v_t = B \cdot v_{t-1} + (1 - B) \cdot x_t$$

Where:

- $v_t$ is the current value of the moving average,
- $v_{t-1}$ is the previous value of the moving average,
- $x_t$ is the current observation (data point),
- $B$ is the smoothing factor, a value between 0 and 1.

## How different values of $B$ affect the weighting:

- **If $B$ is close to 1 (e.g., $B = 0.9$):**
  - **More weight is given to the previous moving average value** ($v_{t-1}$).
  - The influence of the most recent data point ($x_t$) is smaller, making the model more stable and less sensitive to recent changes.
  - In this case, the moving average is "slower" to react to new data, and it "remembers" past data for longer.

$$v_t = 0.9 \cdot v_{t-1} + 0.1 \cdot x_t$$

- **If $B$ is close to 0 (e.g., $B = 0.1$):**
  - **More weight is given to the current observation** ($x_t$).
  - The previous moving average value ($v_{t-1}$) has much less influence, making the model more responsive to recent changes.
  - The model is "faster" to adjust to recent data.

$$v_t = 0.1 \cdot v_{t-1} + 0.9 \cdot x_t$$

- **If $B = 0.5$:**
  - The weights are balanced equally between the previous moving average value and the current observation.

$$v_t = 0.5 \cdot v_{t-1} + 0.5 \cdot x_t$$

## Summary of how $B$ affects the model:

- $B$ **close to 1** (e.g., $B = 0.9$): More weight on previous values, less weight on the current observation. The model is more stable and reacts slowly to changes.
- $B$ **close to 0** (e.g., $B = 0.1$): More weight on the current observation, less weight on the previous values. The model reacts quickly to changes in the data.
- $B = 0.5$: Equal weight on the previous and current values, which results in balanced sensitivity.