Analysis Summary

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October 31, 2025

1 Assumptions

Assumption 1: If a user opens the window multiple times consecutively, only the last open is relevant for measuring the start of the usage session. While this assumption may slightly underestimate the true session duration (by ignoring earlier redundant opens), it guarantees that calculated durations are always non-negative.
Assumption 2: The first close marks the true end of the session. Any additional consecutive closes are redundant since the window is already closed.

2 Duration Formula

Since I already guaranteed positive durations by our approach of choosing the open/close times, the formula is simply the difference between "close" and "open" times.

3 Findings

The **summary statistics** reveal a strong right-skewed distribution in both session types. For automatically opened sessions, the mean duration is around 1 hour and 45 minutes, while the median is only about 3 minutes. That indicates that most sessions are short, but a few extremely long ones (up to nearly 5 days) significantly raise the average.

Manually opened sessions also show skew: the mean duration is roughly 24 minutes, yet the median is just 12 seconds, suggesting that most manual openings are brief, with a few lasting over two days.

The large standard deviations (about 8 hours for auto and 3 hours for manual) further confirm that both distributions are highly variable and dominated by occasional long-lasting sessions.

Auto sessions are long, variable, and passive. The long maximum and high standard deviation show that some tool windows remain open for hours or days. Manual sessions are short and intentional. The median is only 12 seconds. Users are likely to open and close them for quick checks or actions.

In the **CDF plot** (see Figure 1), there is a steeper rise for manual sessions (orange line). Manual sessions reach high CDF values (e.g., 0.9 or 0.95) much faster. Therefore, 90–95% of manual windows close quickly, within a relatively short time span. Auto sessions (blue line) rise more gradually. The blue line lags behind. That implies that auto windows stay open longer. Even though both eventually reach 1.0, a significant portion of auto sessions have higher durations before closing.

There is a heavy tail for auto durations. The long horizontal stretch of the blue line on the right side (past 100k seconds) indicates a few extremely long auto sessions.

In addition, manual sessions plateau earlier, which suggests deliberate user control. People open and close them intentionally.

By analysing **95th percentile durations** (when CDF = 0.95), I can see that auto sessions stay open much longer. 95% of auto tool window sessions last up to 8.7 hours, and the top 5%

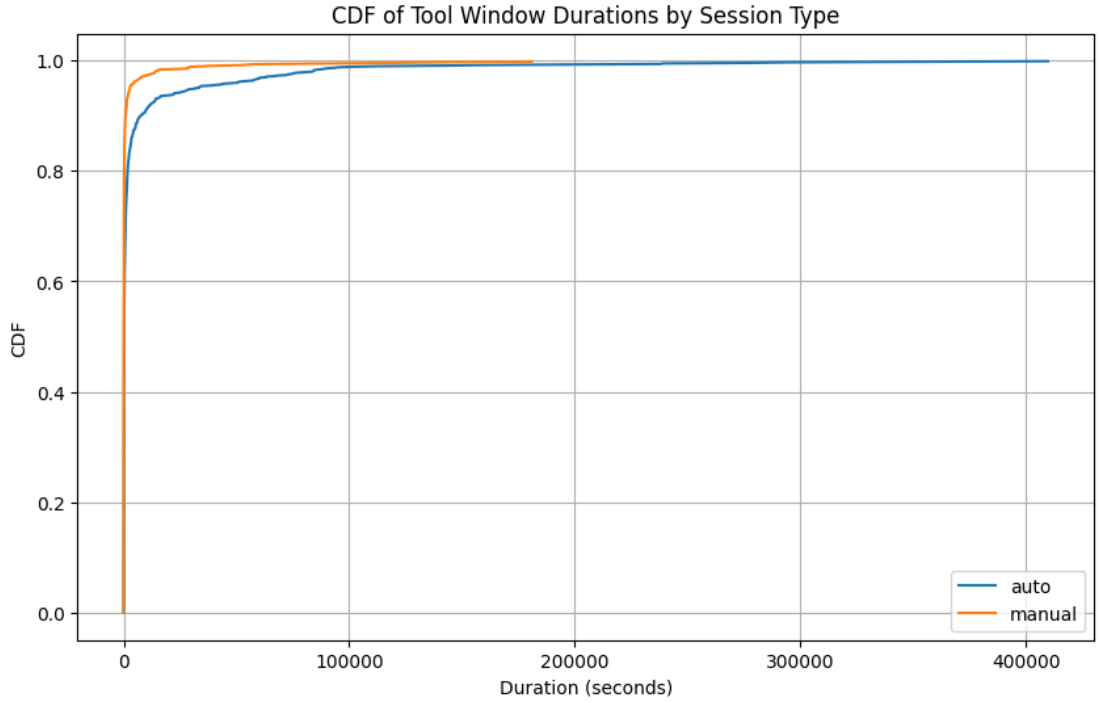

Figure 1: Distribution of session durations by type

go beyond that. This suggests that users rarely close automatically opened windows manually; they stay open passively for long stretches.

Manual sessions are short and deliberate. 95% of manual sessions last less than an hour, showing users typically open these windows only when needed, then close them.

Duration gap is around 10 times. The automatically opened windows persist roughly 10 times longer than the manually opened ones.

As a final step, to statistically assess whether automatic and manual tool window sessions differ, I performed a **Mann–Whitney U test**, which compares the distributions of two independent samples without assuming normality. The null hypothesis stated that there is no difference between auto and manual session durations, while the alternative hypothesis posited that the two types come from different distributions. The test produced a p-value of approximately 2×10^{-63}, which is far below the common significance threshold of 0.05. This extremely small p-value provides overwhelming evidence against the null hypothesis, allowing us to confidently conclude that ***there is a statistically significant difference between automatic and manual session durations***.