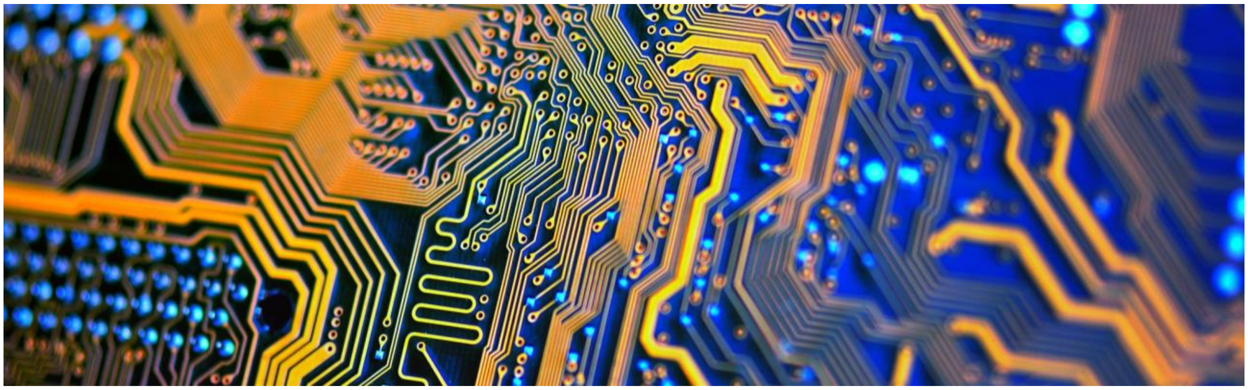
SRE: Application Strength



Application bodybuilding.

Taking exercise as an example, specifically weightlifting, the generally accepted way of knowing how strong you are is to test how much load you can sustain then when you can sustain no more that's your max. Kind of like in high school when you would keep adding weights until the bar landed on your chest. When you were in the gym by yourself you realized some days, you could lift X (typical day), other days X-Y (min) and other days X+Z(max). In these instances, you provide the strength, and the bar provides the load.

Applications tend to have a similar relationship with strength and load. You do some extensive load testing on your application and have an idea of its level of strength. There are many variances in applications (storage, noisy neighbors, queuing, code limitations, networking bottlenecks, processor models, etc) that lead to variations in strength. As the load ramps up, we will see the our arms maybe shake a little, but we will be able to typically be able to handle X load and given the variances X-Y (min – when they do not favor us) and X+Z (when the variances do favor us).

Why does application strength matter? Given a variable of requests per second (RPS) we can use our application strength to mathematically determine if our application can handle a specific load. In everyday situations we target application strength (AS) to be stronger than the weakest load point. So, if load is 10-12 RPS, ideally, we want the AS to be 13+ RPS. However, in real life there is a crossover between the highest RPS load, and we begin to see the strength tested and failures begin.

Example we have our app has an average AS of 2000 RPH (per hour) with standard deviation of 500 RPS. We expect a marketing campaign to increase traffic (load) from the typical 1000 RPS to 1700 RPH with a standard deviation of 200. We know this load will last approximately 8 hours. Should we make changes to increase our strength or let play out?

1. First let's calculate the safety margin: (S – L) / (((S_stdev^2) - (L_stdev^2)) ^ ½).
2. (2000-1700) / ((500^2 – 200^2) ^ ½) = **0.6546536707** this is the relative separation between the means of S and L.
3. We take this value and run it through the [Standard Cumulative Normal Distribution Function]() = **.74215** this is probability we survive 1 load application.

4. There are 8 load applications (8 hours). We use the p ^n to calculate the reliability: .74215 ^8 = **9.2%**