Reasoning about a w.h.p. statement with i) an asymptotic bound in the event description and ii) a $\forall$ quantifier with respect to α.

In a simple case, a w.h.p. statement only requires an existence proof of an asymptotic probability bound (α and other constants exist) for an event description without an asymptotic bound.

Steps for reasoning about a w.h.p. statement with i) an asymptotic bound in the event description and ii) a $\forall$ quantifier with respect to α:

1) assume a specific pair (c, n_0) for the event bound

2) show there exist constants for a probability bound: c maps to $\alpha \geq 1$ $\forall n$, thus n_0 can be used for the probability bound

3) if any event bound (c, n_0) maps to a probability bound, and any $c \geq c_0$ with $c_0 > 0$ maps 1:1 to $\alpha \geq 1$, then any $\alpha \geq 1$ maps to an event bound

e.g. $\alpha = c - 1$, $c_0 = 2$

In the randomized skip list analysis, each w.h.p. bound is a <u>bound on one property with respect to another property</u> of randomized skip list structure.

On different machines, executing the same traversal in a given randomized skip list structure may take a different number of machine steps. Suppose $O(g(n))$ is event bound and $\alpha \geq 1$ maps to (c, n_0) "in-structure", then for any machine there exist c' and $n_0' \geq n_0$, such that $cg(n) \leq c'g(n)$ $\forall n > n_0'$. The inequality with the probability bound remains true.