We define a ranked poset using the shortest paths in the Bruhat graph of a finite Coxeter group $W$ from the identity to the longest word of $W$, $w_0$. We show that this poset is the union of Boolean posets of rank absolute length of $w_0$, $\ell_T(w_0)$. That is, any set of reflections $\{t_1, \ldots, t_{\ell_T(w_0)}\}$ so that $t_1 \cdots t_{\ell_T(w_0)} = w_0$ is fully commutative and describes a path in the Bruhat graph from $e$ to $w_0$. This allows us to give a combinatorial interpretation of the lowest-degree terms in the complete cd-index of $W$. (Received August 27, 2009)