We explore the (noncommutative) geometry of representations of locally finite Lie algebras. Let $L$ be one of these Lie algebras, and let $I \subseteq U(L)$ be the annihilator of a locally simple $L$-module. We show that for each such $I$, there is a quiver $Q$ so that locally simple $L$-modules with annihilator $I$ are parameterized by “points” in the “noncommutative space” corresponding to the path algebra of $Q$. We classify the quivers that occur and along the way discover a beautiful connection to characters of the symmetric groups $S_n$. (Received September 20, 2016)