Exercise 1. Prove that for any 2-category $\mathcal{C}$ and any adjunction $f \dashv g$ in $\mathcal{C}$, one can build a monad in $\mathcal{C}$ whose underlying morphism is $f ; g$.

Exercise 2. Prove that, in the 2-category $\text{CAT}$, for every monad $\mathcal{M}$ with underlying functor $M$ on a category $\mathcal{C}$ there is some adjunction $F \dashv U$ such that $M$ equals $F ; U$. Hint: use the underlying functor $U : \text{Alg}(\mathcal{M}) \to \mathcal{C}$ as the right adjoint.

Remark. The above theorem holds for monads in $\text{CAT}$ but not necessarily for monads in other 2-categories.