

## W4-2-2 Helmholtz energy 2

Provide the differential expression for the Helmholtz energy,  $da$ , by using  $du$ . What are the variables for the Helmholtz energy?

$a = u - Ts \rightarrow da = du - d(Ts) = Tds - Pdv - Tds - sdT = -Pdv - sdT$ .  
The variables for the Helmholtz energy are  $T$  and  $v$ .