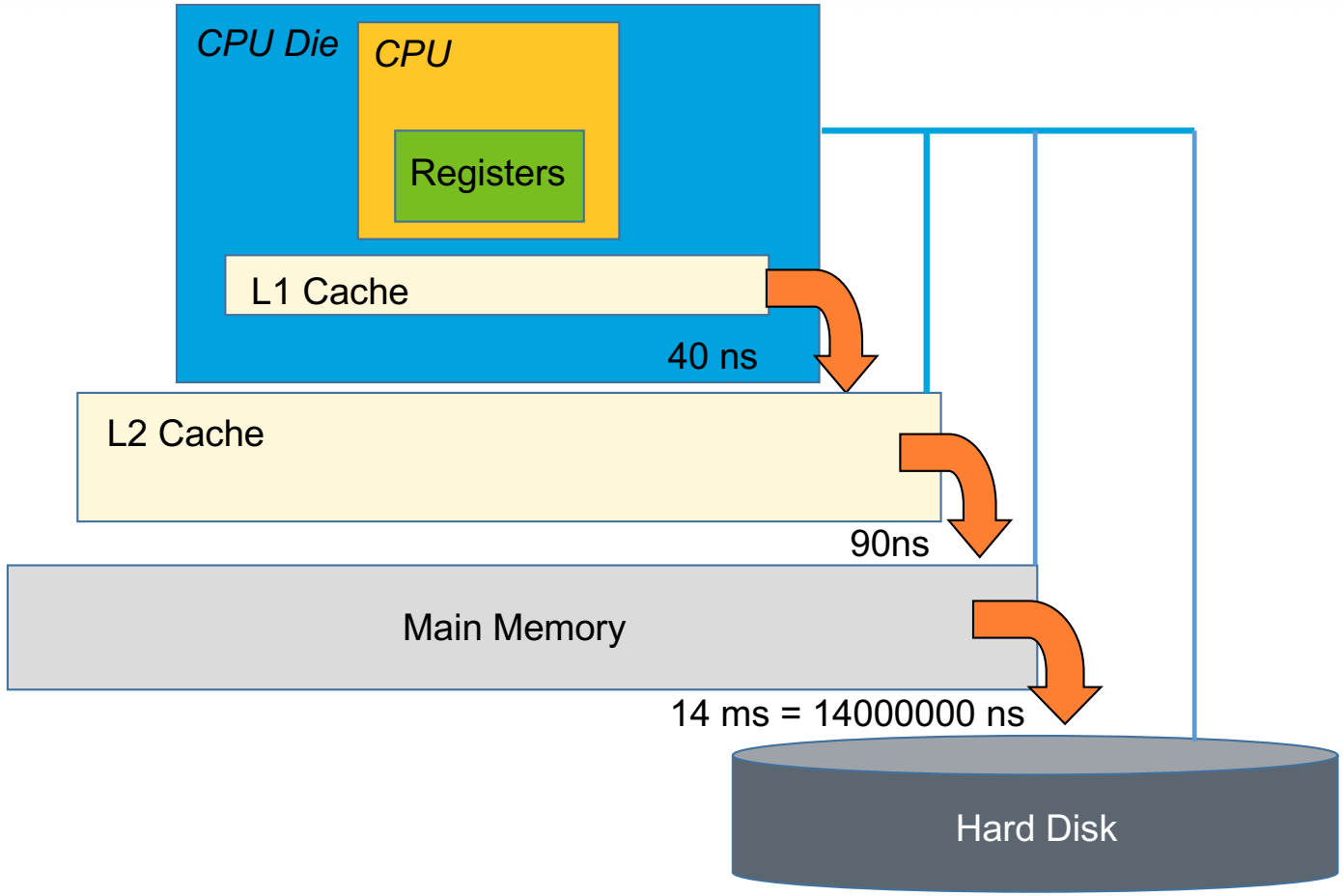
Fundamental Operators

Let **r** and **s** be relations with **schemas R and S**

union	$r \cup s = \{ t \mid t \in r \vee t \in s \}$
difference	$r - s = \{ t \mid t \in r \wedge t \notin s \}$
cartesian_product	$r \times s = \{ t \mid t = t_r t_s \text{ where } t_r \in r \wedge t_s \in s \}$
selection	$\sigma_P(r)$
projection	$\pi_A(r)$

The Memory Hierarchy

Example:
Intel PIII
CPU: 450MHz
Memory: 512MB



Internal Data Storage

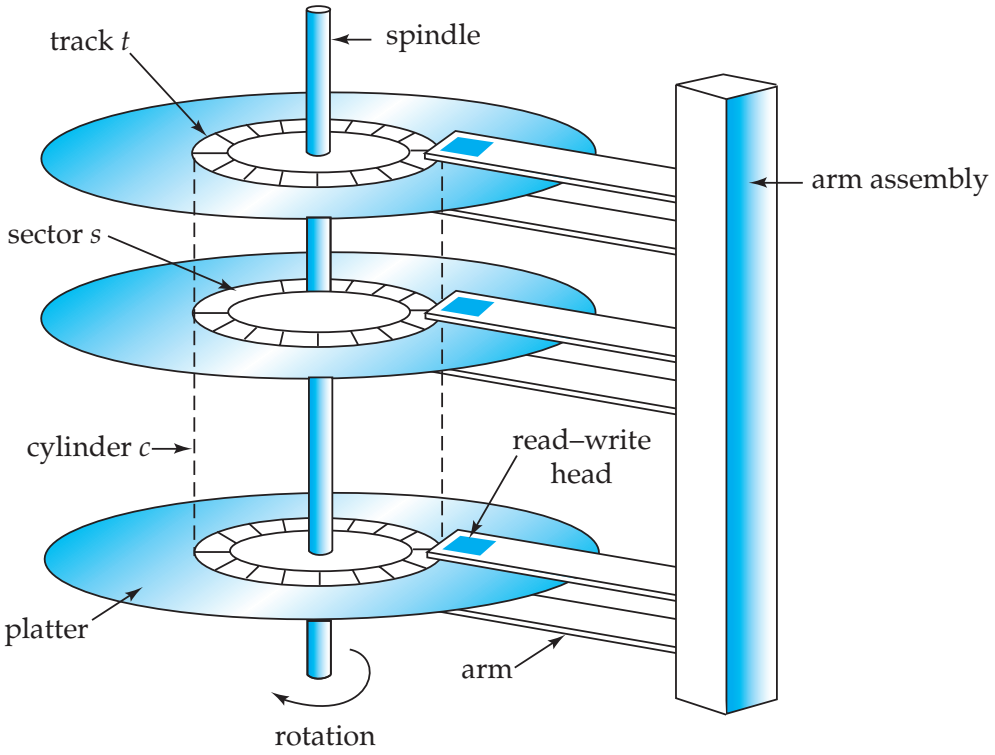
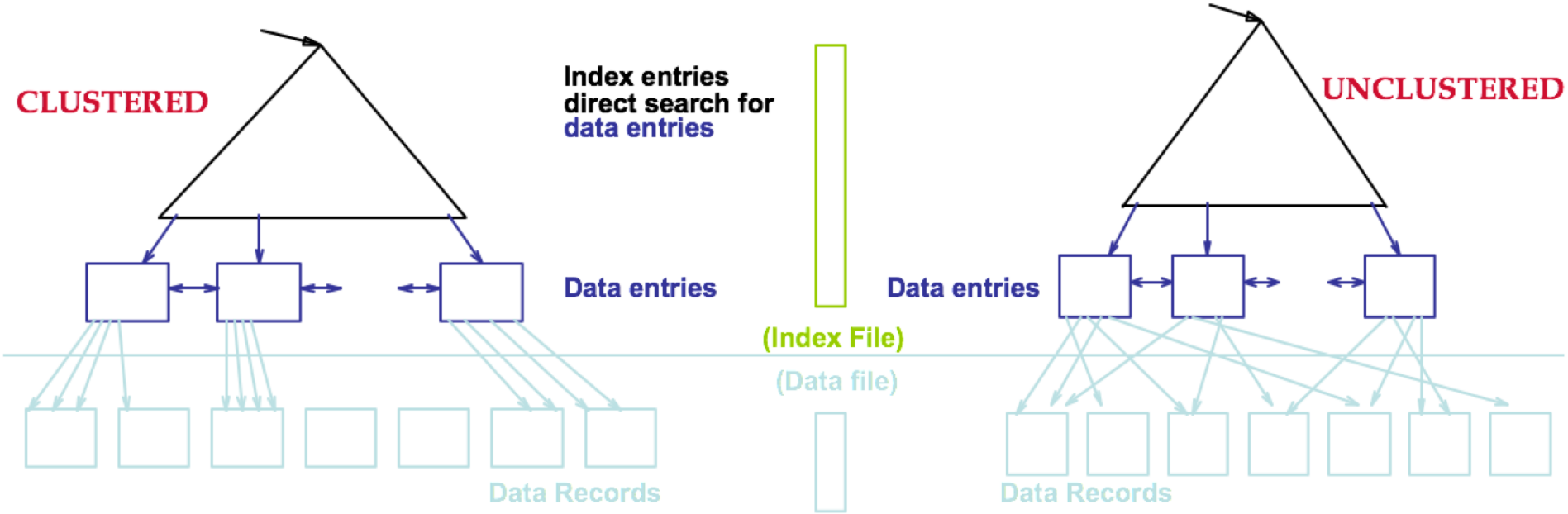


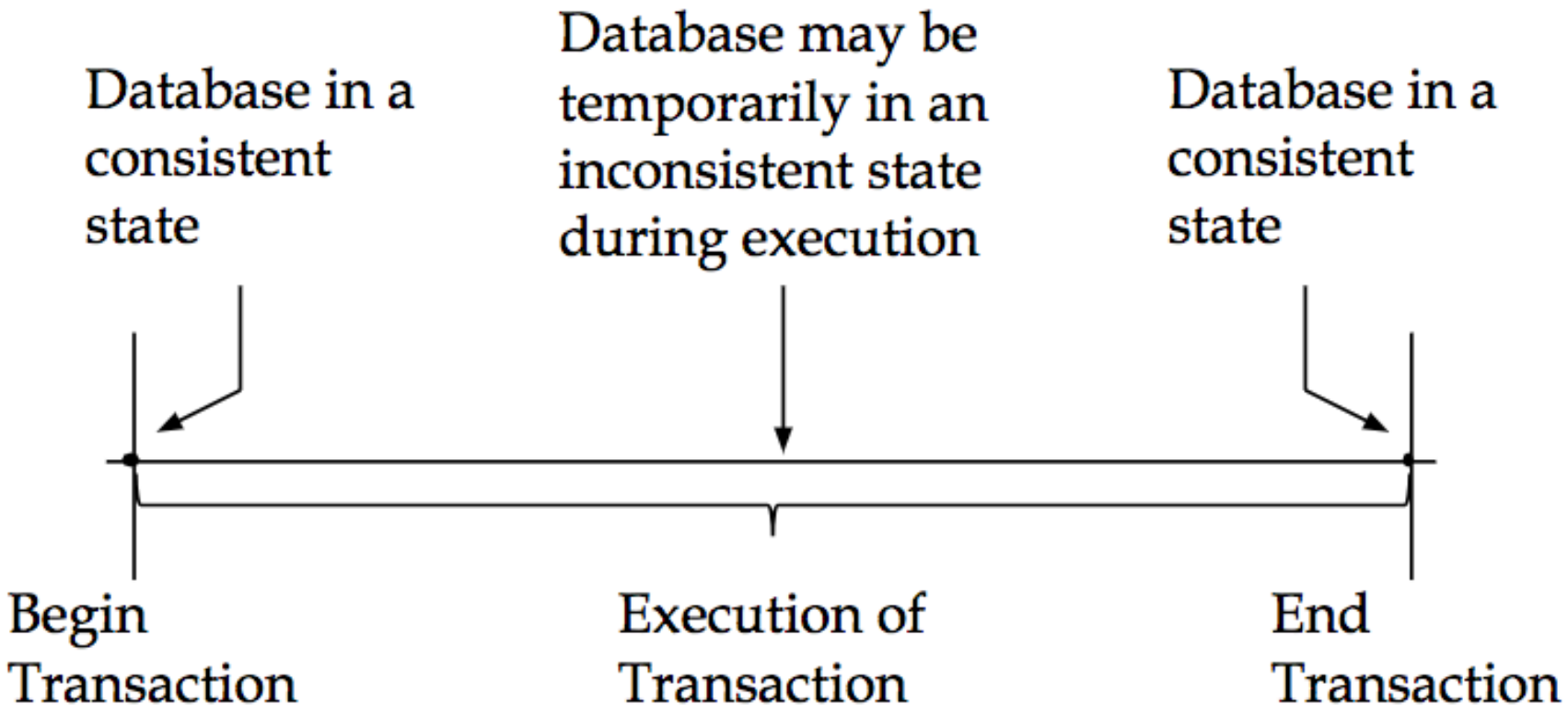
Image source: https://www.snia.org

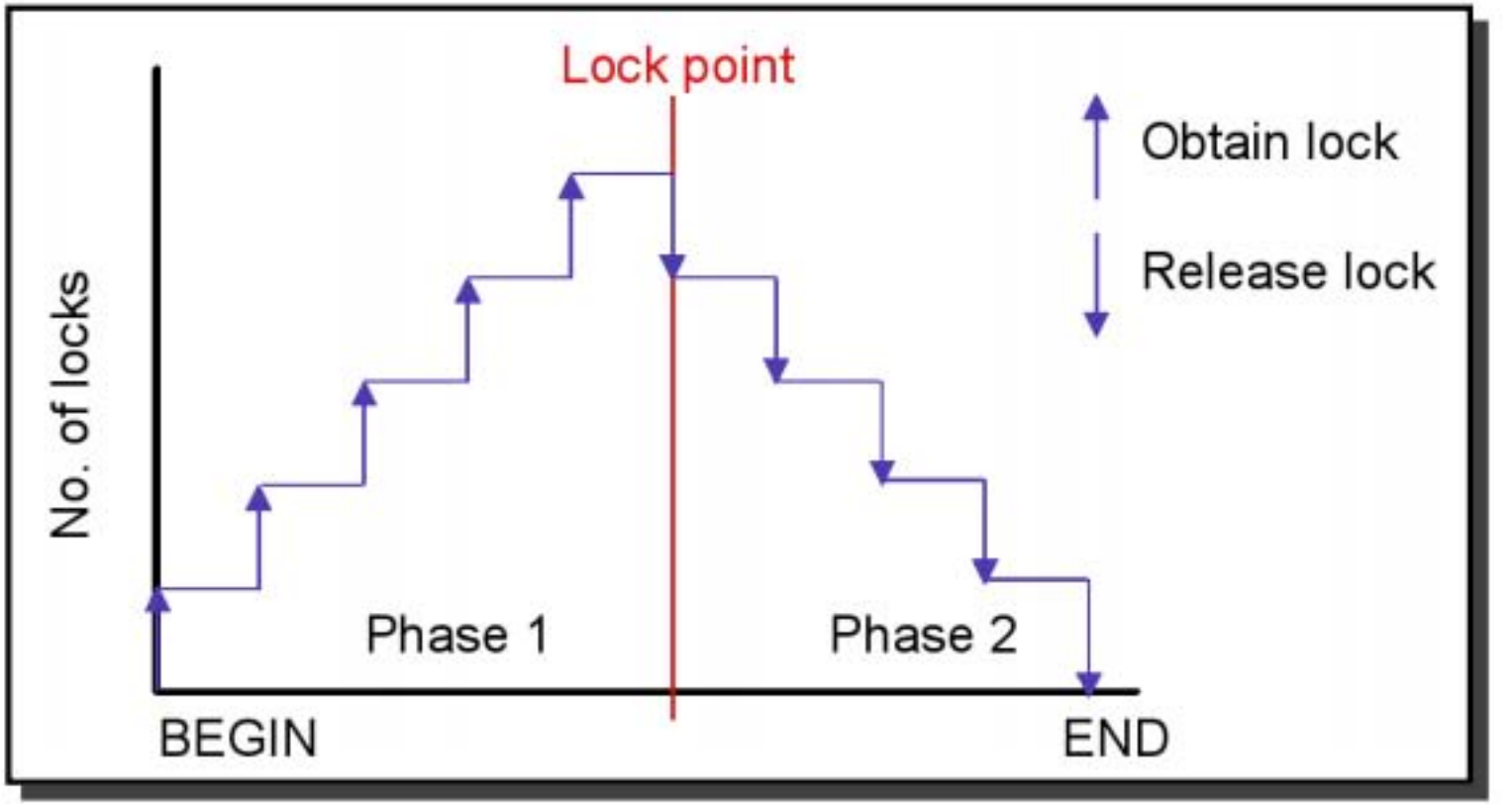
Clustered vs. Unclustered Index

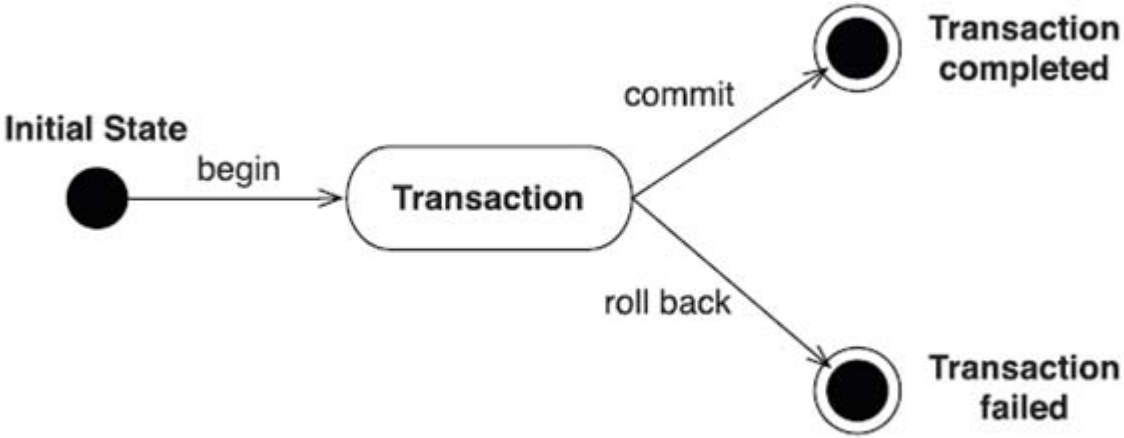


Transaction ACID Properties

Transactions




Lock point
Obtain lock
Release lock
No. of locks
Phase 1
Phase 2
BEGIN
END


Initial State
begin
Transaction
commit
Transaction completed
roll back
Transaction failed