L17: Isolation

Frans Kaashoek & Nickolai Zeldovich
6.033 Spring 2012
Concurrent actions

\texttt{xfer(a, b, amt):}
    \texttt{begin}
    \texttt{a = a – amt}
    \texttt{b = b + amt}
    \texttt{commit}

\texttt{interest(rate):}
    \texttt{begin}
    \texttt{for each account x:}
    \texttt{\hspace{1cm} x = x \ast (1+rate)}
    \texttt{commit}
Locking protocol

read(var):
    if var.lock not held:
        acquire(var.lock)
    return var.value

write(var, newval):
    if var.lock not held:
        acquire(var.lock)
    var.value = newval
Locking protocol with release

read(var):
    if var.lock not held:
        acquire(var.lock)
    return var.value

write(var, newval):
    if var.lock not held:
        acquire(var.lock)
    var.value = newval

commit():
    write commit record
    release all locks
Locking with reader-writer locks

read(var):
    if var.lock not held:
        acquire_reader(var.lock)
        # block if any writers
    return var.value

write(var, newval):
    if var.lock not held as writer:
        acquire_writer(var.lock)
        # block if any readers or writers
    var.value = newval
read-committed isolation

Setup: table with doctors, oncall=false

T1:
select count(*) from doctors where oncall=false;
select count(*) from doctors where oncall=false;

T2:
update doctors set oncall=true where username = 'bob';
commit;
Snap-shot isolation

Setup: table with doctors, oncall=true

T1:

select count(*) from doctors where oncall=true;
update doctors set oncall=false where username = 'alice';

T2:

select count(*) from doctors where oncall=true;
update doctors set oncall=false where username = 'bob';