Time and Clocks

Event Ordering in Make
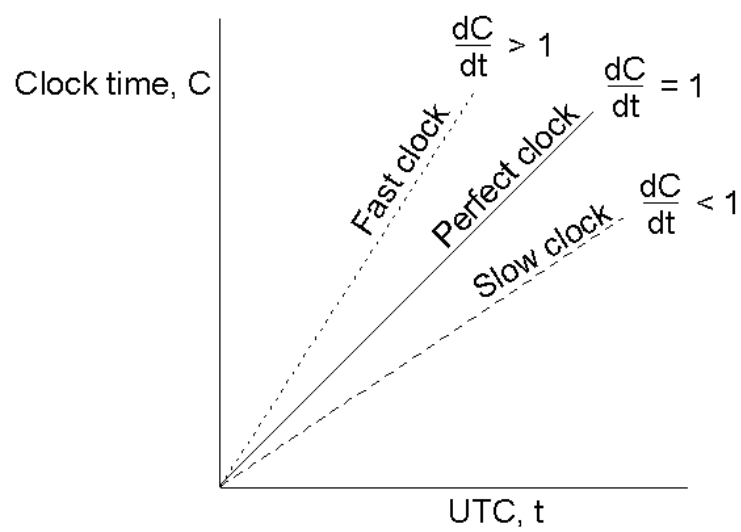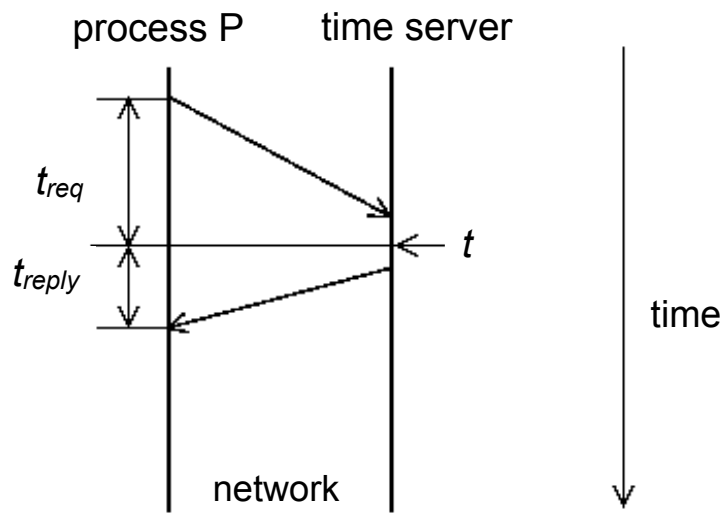
Computer on which compiler runs

2144   2145   2146   2147   ← Time according to local clock

output.o created

Computer on which editor runs

2142   2143   2144   2145   ← Time according to local clock

output.c created
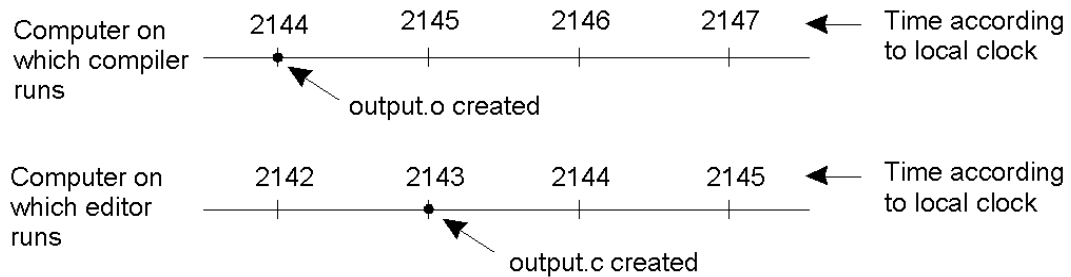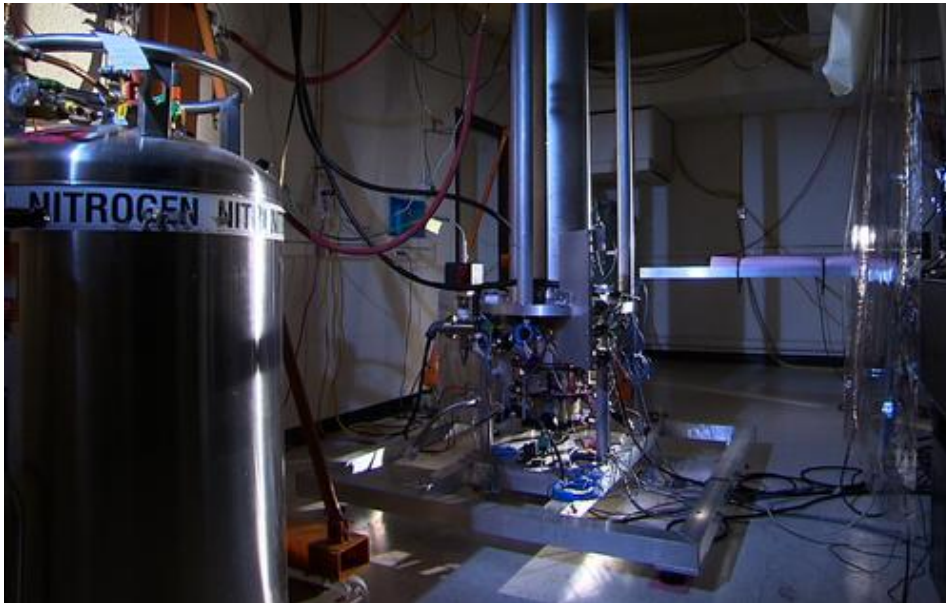
Atomic Clock!

Clock Synchronization

Cristian's Algorithm

process P   time server

t_{req}

t_{reply} t

time

network

Berkeley Algorithm

Time daemon

3:00   3:00

3:00   3:00

Network

2:50   3:25

(a)

3:00   0

-10   +25

2:50   3:25

(b)

3:05   +5

+15   -20

3:05   3:05

(c)
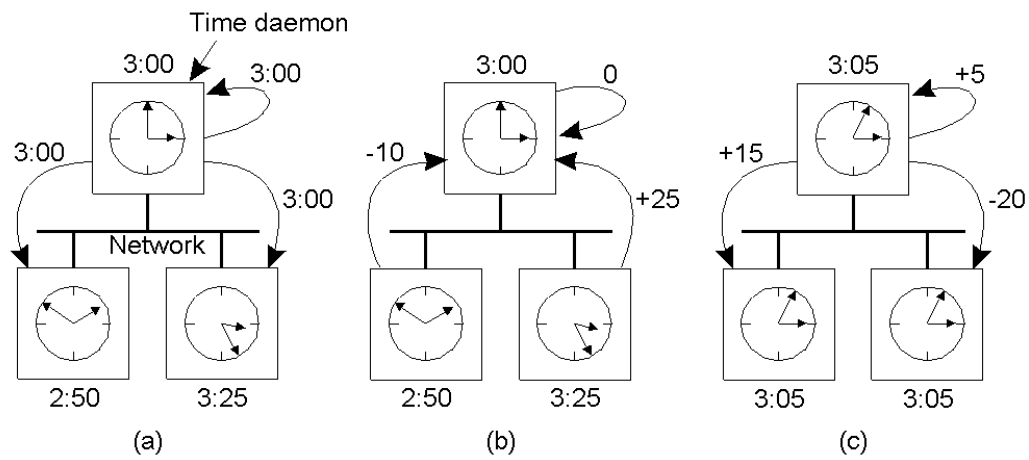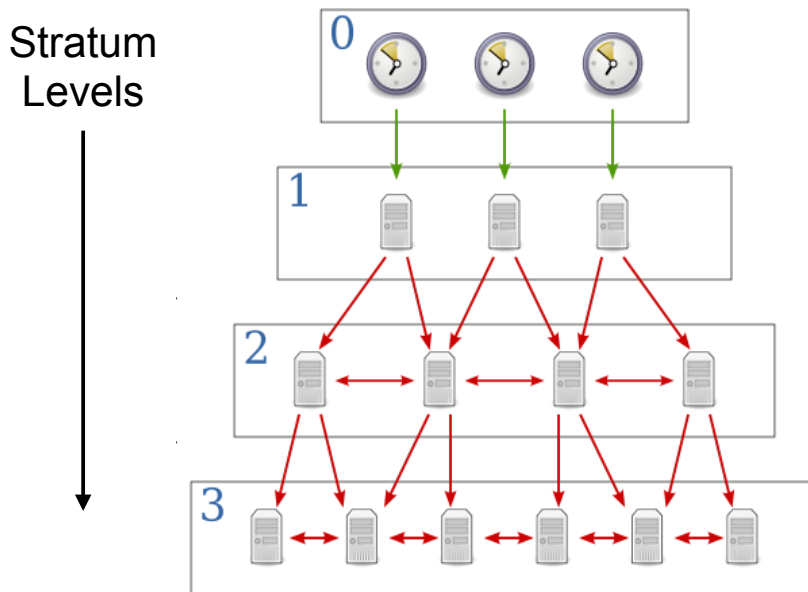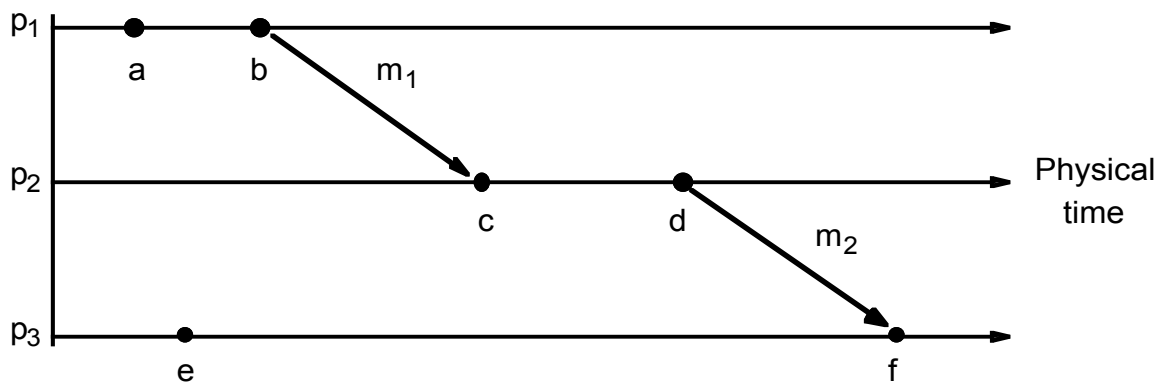
Network Time Protocol (NTP)

Stratum Levels

Logical Clocks

Lamport Clocks

Vector Clocks