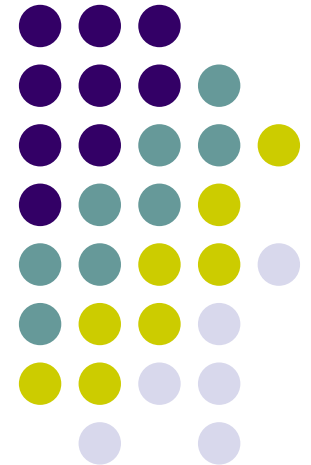
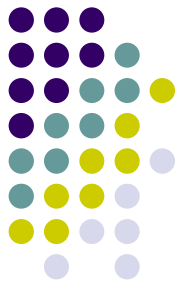


5

Thread

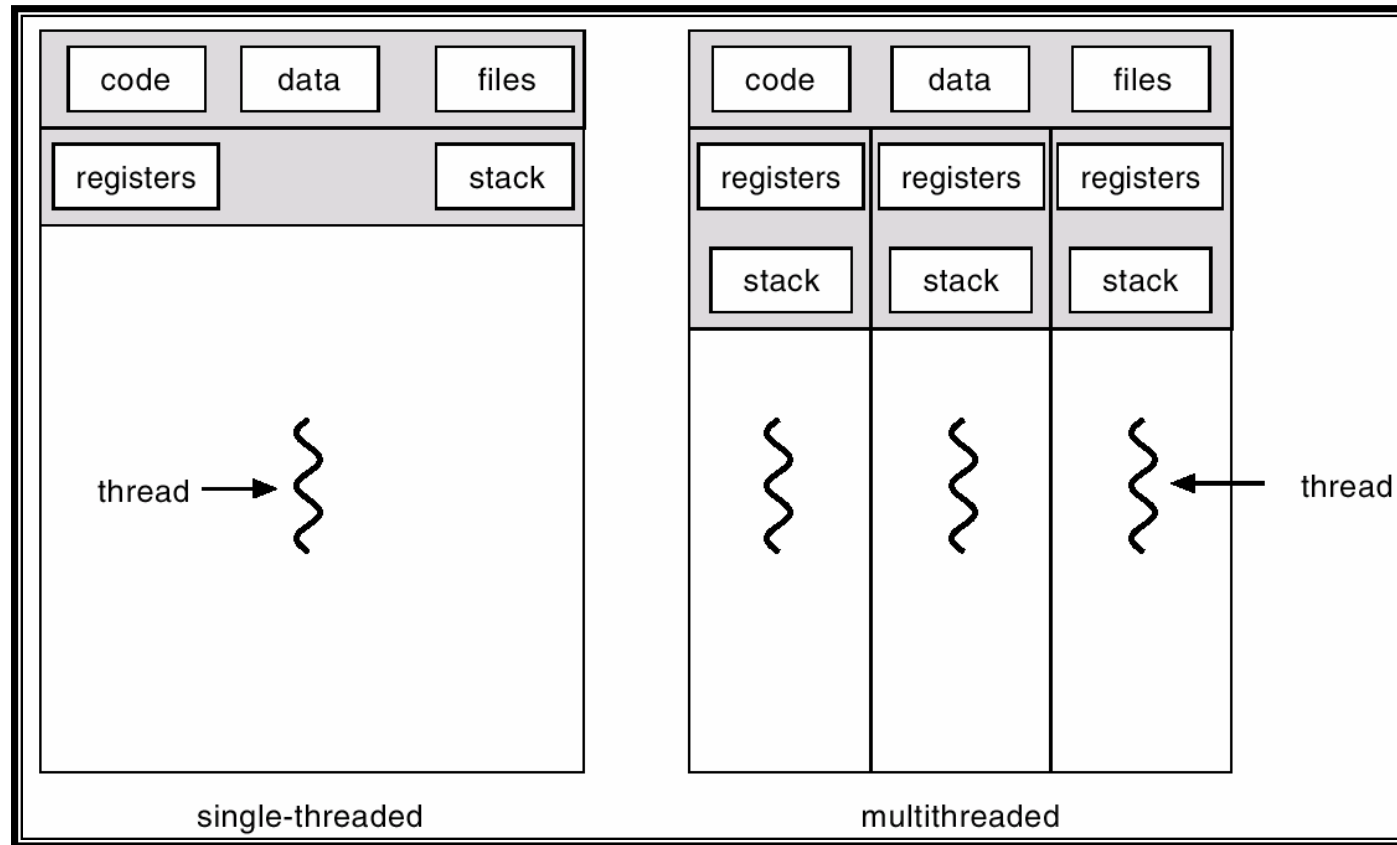
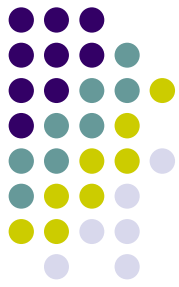


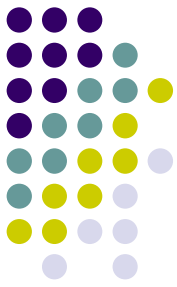


Thread

- Program yang dieksekusi :
 - Proses berat (heavyweight) => proses tradisional
 - Proses ringan (lightweight) => THREAD
- Thread terdiri dari ID thread, program counter, himpunan register dan stack.
- Thread dapat melakukan lebih dari satu pekerjaan pada waktu yang sama.

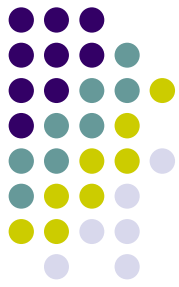
Proses Single and Multithread





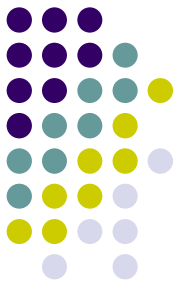
Keuntungan

- Tanggap
- Pembagian Sumberdaya (Resource Sharing)
- Ekonomis
- Pemberdayaan arsitektur multiprosesor



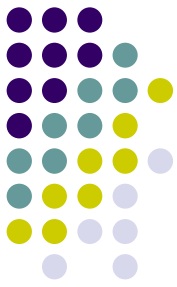
User Thread

- Pengelolaan thread dilakukan oleh user level
- Contoh :
 - POSIX *Pthreads*
 - Mach *C-threads*
 - Solaris *threads*



Kernel Thread

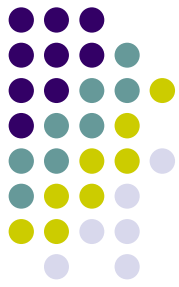
- Didukung oleh Kernel
- Contoh :
 - Windows 95/98/NT/2000
 - Solaris
 - Tru64 UNIX
 - BeOS
 - Linux



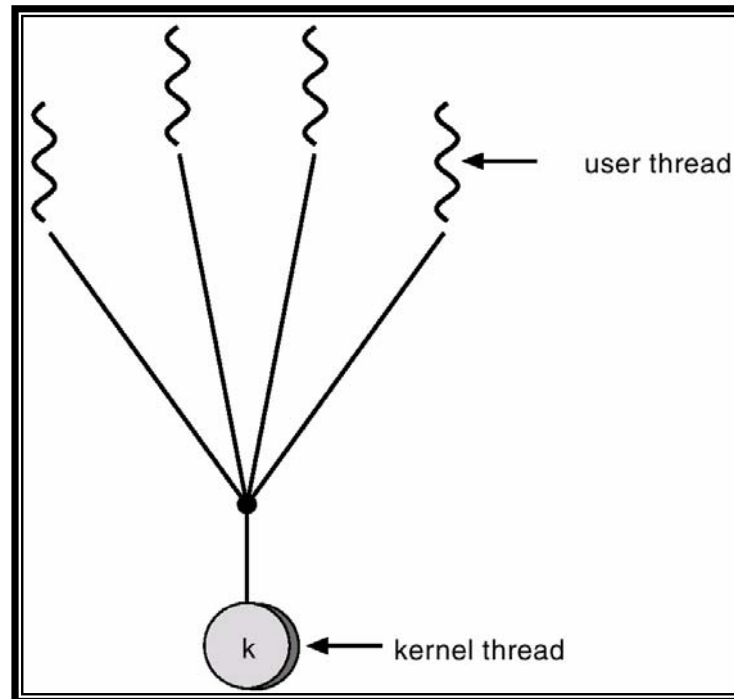
Model Multithreading

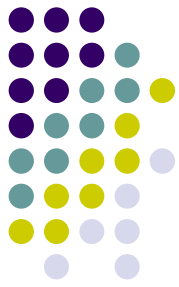
- Many-to-One
- One-to-One
- Many-to-Many

Many-to-One



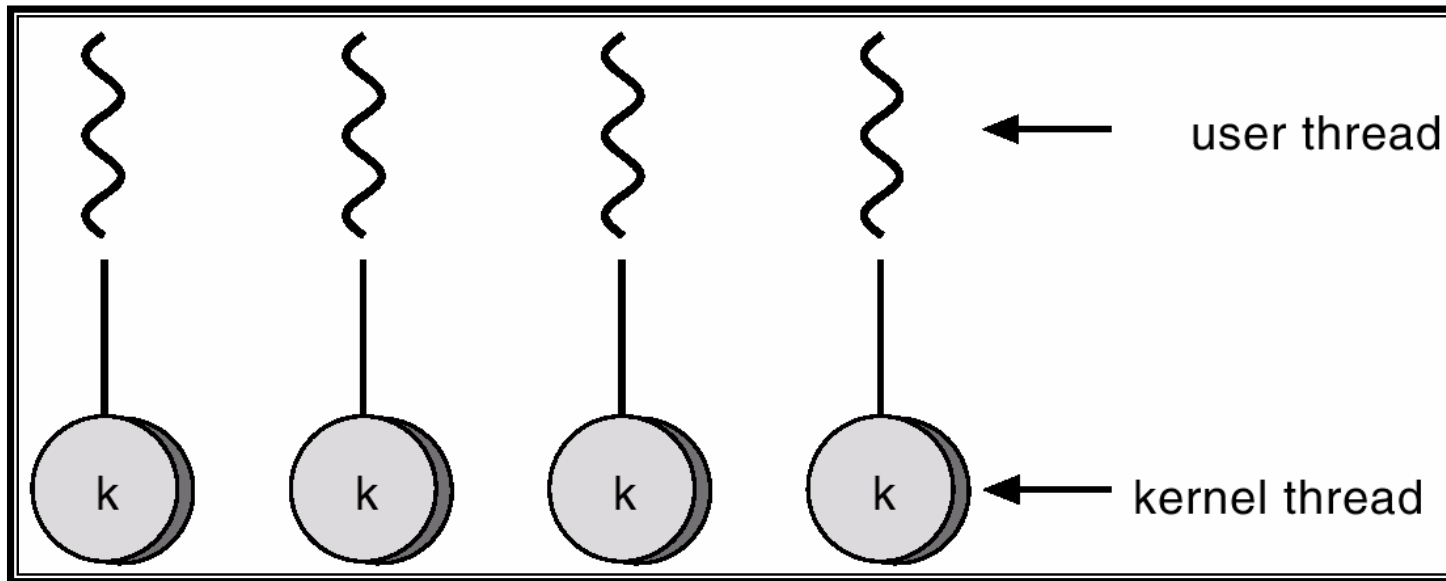
- Beberapa thread user-level dipetakan ke dalam single kernel thread
- Penggunaannya pada sistem tidak memerlukan dukungan kernel thread

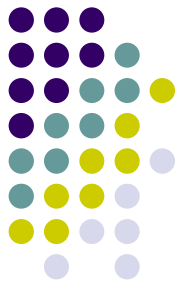




One-to-One

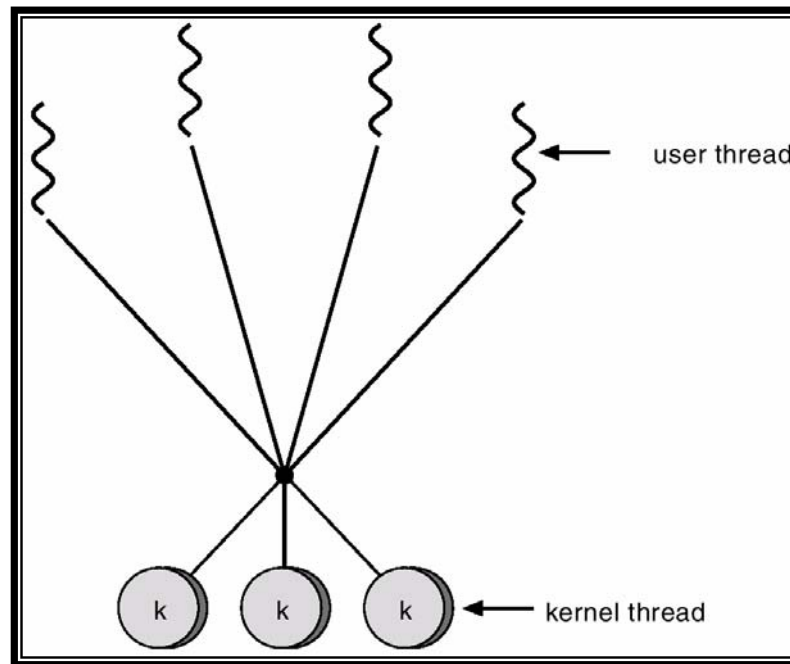
- Setiap user-level thread dipetakan ke kernel thread.
- Contoh :
 - Windows 95/98/NT/2000
 - OS/2

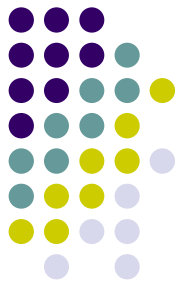




Many-to-Many Model

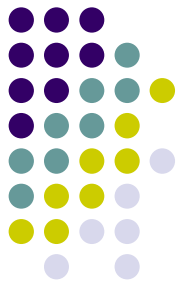
- Membolehkan setiap user-level thread dipetakan ke banyak kernel thread
- Membolehkan sistem operasi membuat sejumlah kernel thread
- Contoh :
 - Windows NT/2000 dengan paket *ThreadFiber*
 - Solaris 2





Isu Threading

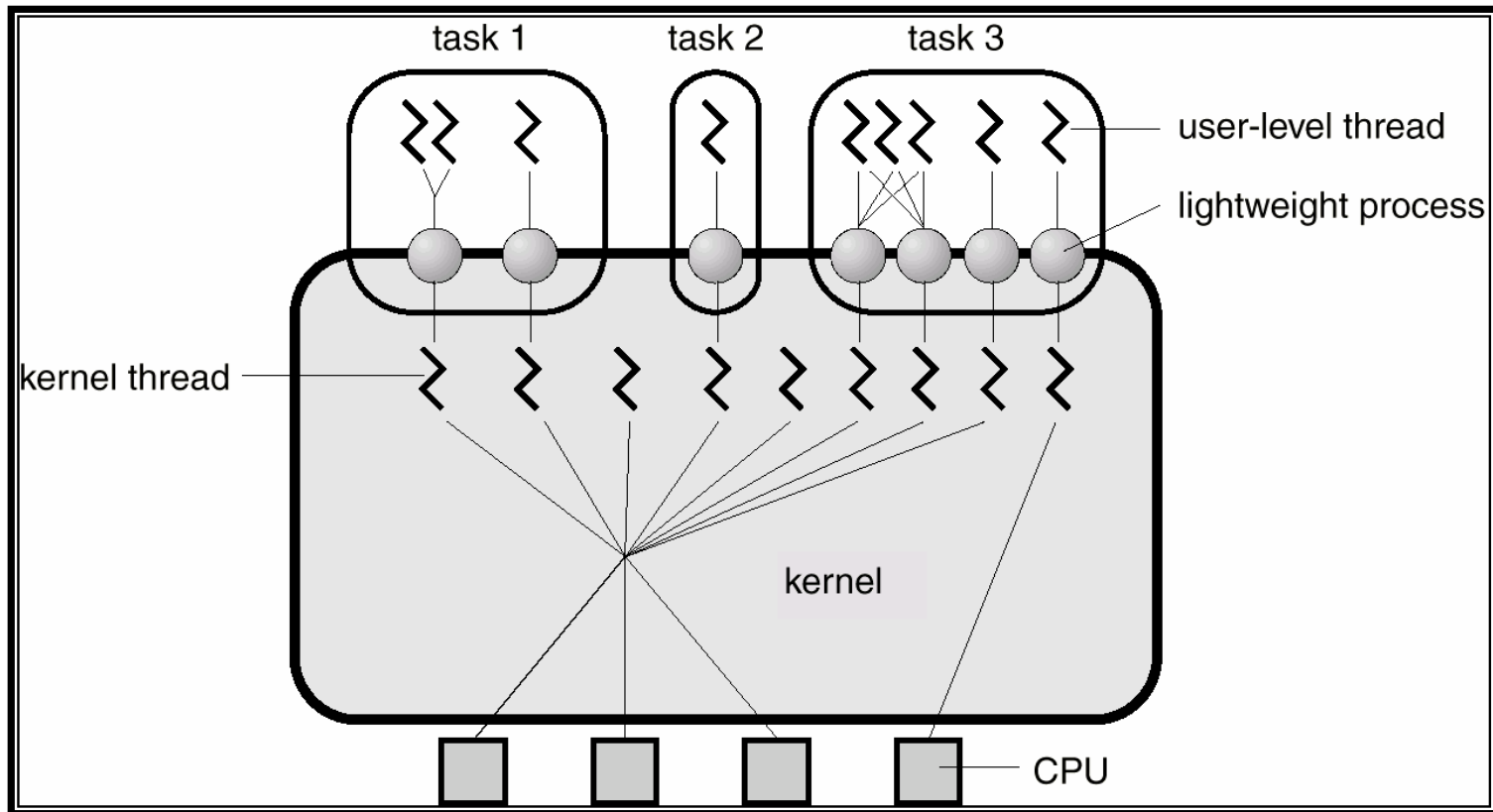
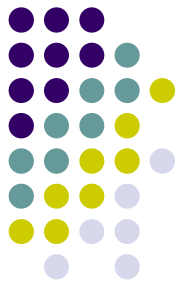
- Semantik dari `fork()` dan `exec()` system calls.
- Pembatalan thread.
- Penanganan signal
- Pengelompokan thread
- Thread untuk data spesifik



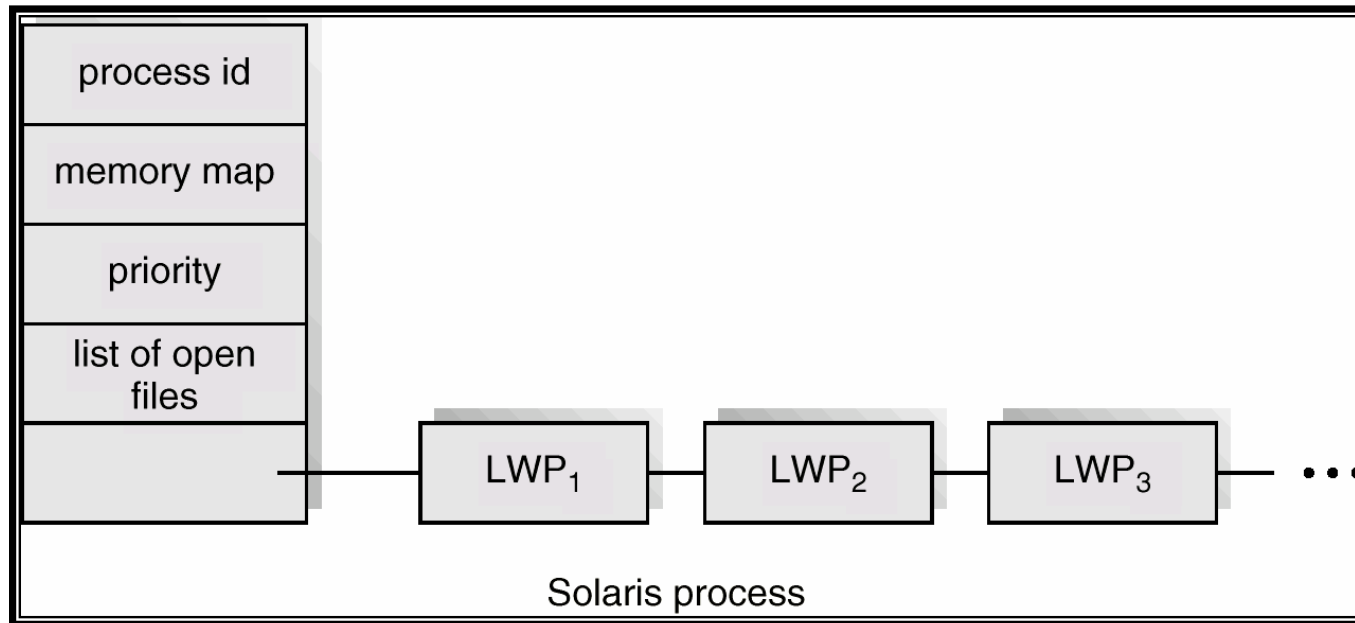
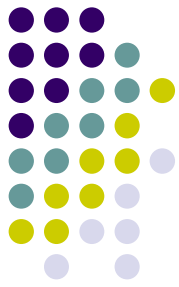
Pthreads

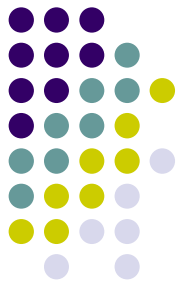
- Suatu POSIX standard (IEEE 1003.1c) API untuk pembuatan thread dan sinkronisasi synchronization.
- API menentukan perlakuan terhadap thread library, dan implementasi pembangunan library.
- Ditemui pada sistem operasi UNIX.

Solaris 2 Threads



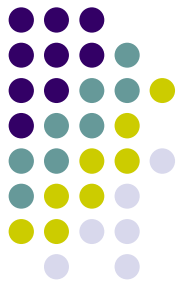
Solaris Process





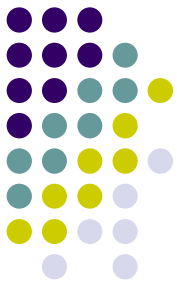
Windows 2000 Threads

- Implementasi menggunakan pemetaan one-to-one
- Setiap thread terdiri dari :
 - thread id
 - register set
 - pembagian user dan kernel stacks
 - private data storage area



Linux Threads

- Linux lebih mengacu pada *tasks* dibandingkan *threads*.
- Pembuatan thread dilakukan menggunakan sistem `clone()` system call.
- `Clone()` membolehkan child task untuk berbagi ruang alamat pada parent task (proses)



Java Threads

- Java threads dibuat melalui :
 - Extending Thread class
 - Implementasi Runnable interface
- Java threads dikelola oleh JVM.

Java Thread States

