

Simplethreads API

```

void sthread_init()
    * Initialize the whole system
sthread_t sthread_create(func start_func,
    void *arg)
    * Create a new thread and make it runnable
void sthread_yield()
    * Give up the CPU
void sthread_exit(void *ret)
    * Exit current thread
void* sthread_join(sthread_t t)
    * Wait for specified thread to exit

```

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Simplethreads internals

*Structure of the TCB:

```

struct _sthread {
    sthread_ctx_t *saved_ctx;
    /**
     * Add your fields to the thread
     * data structure here.
    */
};

```

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Sample multithreaded program

```

int main(int argc, char **argv) {
    sthread_init();
    for(i = 0; i < 3; i++) {
        if (sthread_create(thread_start,
                           (void *)i) == NULL) {
            printf("sthread_create failed\n");
            exit(1);
        }
    }
    sthread_yield();
    printf("back in main\n");
    return 0;
}

```

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Managing contexts

*Thread context = thread stack + stack pointer

```

sthread_new_ctx(func_to_run)
    * creates a new thread context that can be switched to
sthread_free_ctx(some_old_ctx)
    * Deletes the supplied context
sthread_switch(oldctx, newctx)
    * Puts current context into oldctx
    * Takes newctx and makes it current

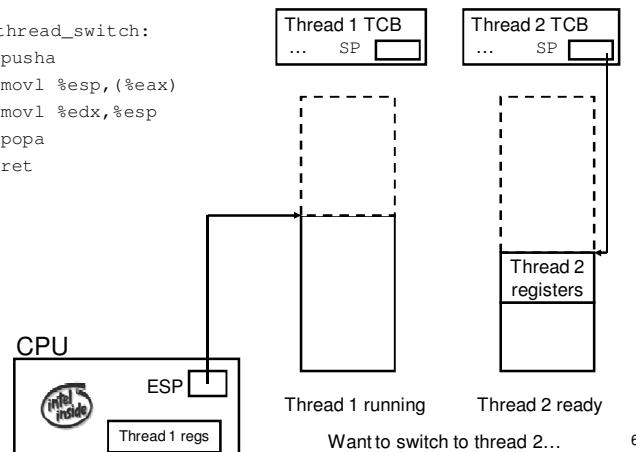
```

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How `sthread_switch` works

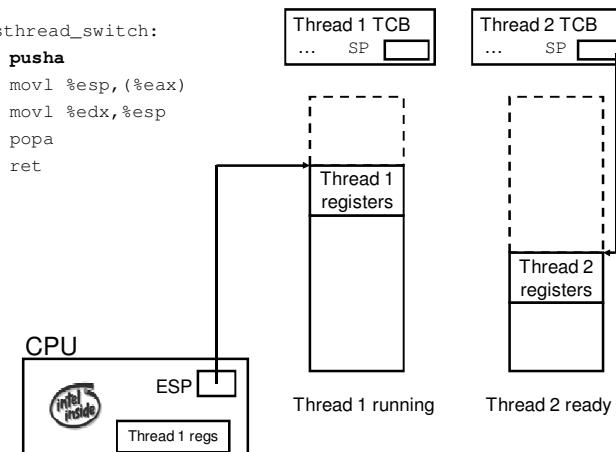
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```



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Push old context

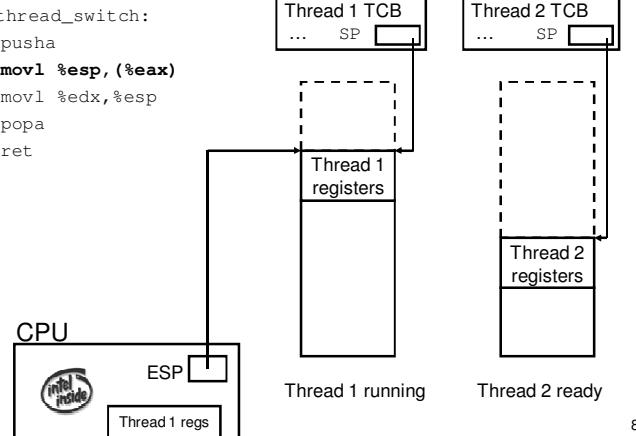
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```



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Save old stack pointer

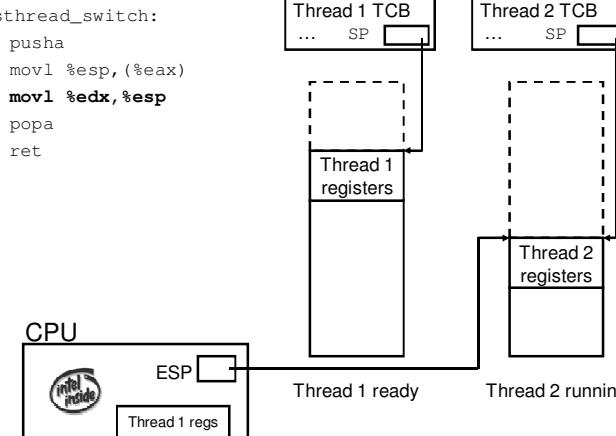
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```



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Change stack pointers

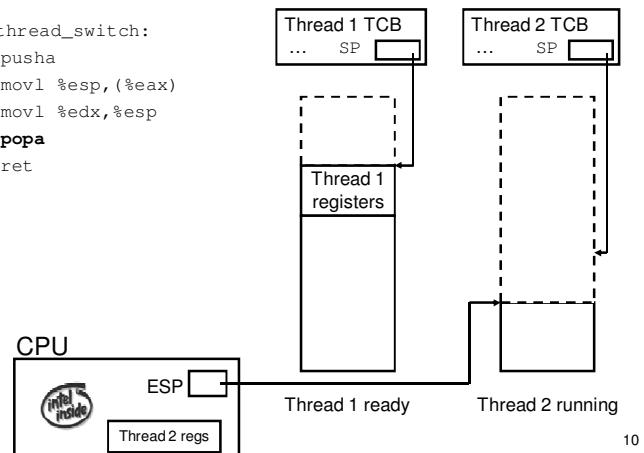
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```



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Pop off new context

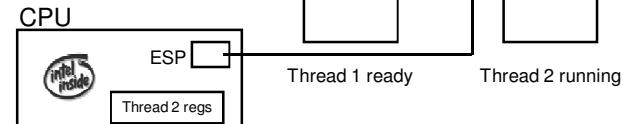
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```



Done; return

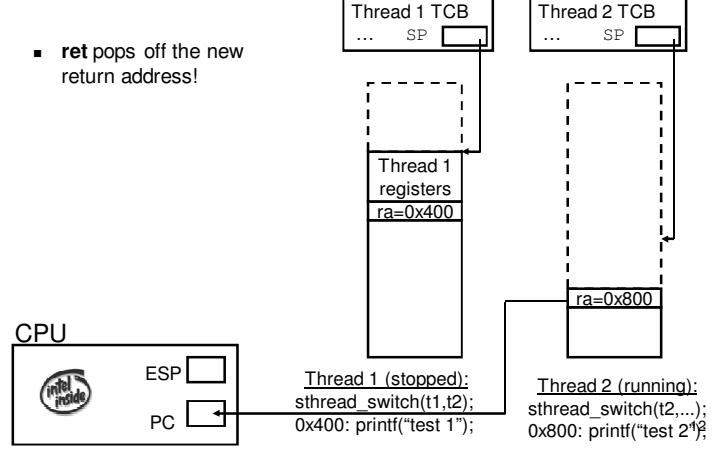
```
Xsthread_switch:
pusha
movl %esp,(%eax)
movl %edx,%esp
popa
ret
```

- What got switched?
 - ESP
 - Other registers
 - PC (how?)



Adjusting the PC

- ret pops off the new return address!



Trabalho para casa

1. Descobrir como acontece o despacho periódico nas stthreads
2. Perceber onde é feito o escalonamento round-robin das stthreads

(Discutiremos vossas conclusões na próxima aula teórica.)