

GCC and operating systems

- a compiler and operating systems are often co-dependant
- during this weeks lecture we have examined the implementation of SYSTEM_TRANSFER in GNU LuK
- copy the following code into the C file suggested

GCC and operating systems

testgcc.c

```

void interruptsOn (void)
{
    asm volatile ("sti");
}

void interruptsOff (void)
{
    asm volatile ("cli");
}

unsigned int getFlags (void)
{
    unsigned int b;

    asm volatile("pushf ; popl %%ebx ; movl %%ebx, %[b]" :
                return b;
}

```

GCC and operating systems

■ testgcc.c

```

typedef void *PROCESS;

int turnInterrupts (int oo)
{
    unsigned int flags = getFlags();
    if (oo)
        interruptsOn ();
    else
        interruptsOff ();

    return (flags & (1 << 9)) != 0;
}

```

GCC and operating systems

testgcc.c

```

void SYSTEM_TRANSFER (PROCESS *p1, PROCESS p2)
{
    int toOldState;

    toOldState = turnInterrupts (0);
    asm volatile ("pusha ; pushf"); /* push all register
    /* remember p1 is **void */
    asm volatile ("movl %[p1], %%eax ; movl %%esp, (%%eax)
    :: [p1] "rm" (p1)); /* p1 := top of stack
    asm volatile ("movl %[p2], %%eax ; movl %%eax, %%esp"
    :: [p2] "rm" (p2)); /* top of stack := p2
    asm volatile ("popf ; popa"); /* restore all register
    toOldState = turnInterrupts (toOldState);
}

```

GCC and operating systems

- compile this program using
- ```
$ gcc -o testgcc-unoptimized.s -m32 -S testgcc.c
```
- produce an instruction by instruction commentary of the function `SYSTEM_TRANSFER`
  - the output of the compiler is placed into `testgcc-unoptimized.s`

## GCC and operating systems

- now recompile the program using:
- ```
$ gcc -O3 -o testgcc-optimized.s -m32 -S testgcc.c
```
- the output from the compiler is placed into `testgcc-optimized.s`
- produce an instruction by instruction commentary of the function `SYSTEM_TRANSFER`
 - which is easier to understand, the optimised or unoptimised assembly output?