西安交通大学
软件学院

操作系统原理

Operating System Principle

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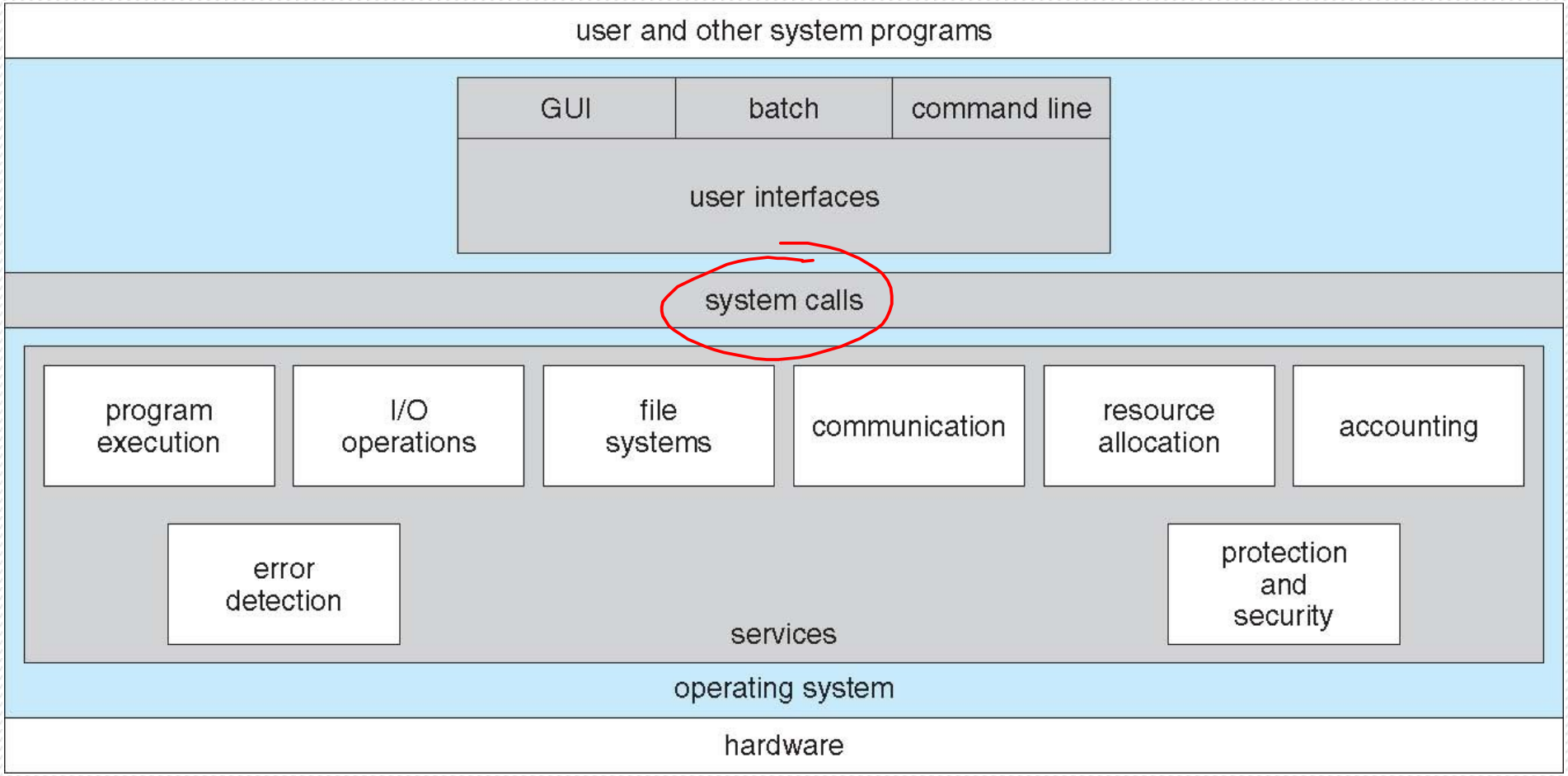
2-4 系统调用

A View of Operating System Services



System Calls
系统调用

(How to use?)

System calls provide the interface between a running program and the operating system.

系统调用提供在运行程序和操作系统之间的接口

Generally available as assembly-language instructions.
通常以汇编语言指令形式提供

Languages defined to replace assembly language for systems programming allow system calls to be made directly (e.g., C. Bliss, PL/360)
替代汇编语言的、供系统编程的语言，允许直接使用系统调用

System Calls
系统调用

Mostly accessed by programs via a high-level Application Program Interface (API) rather than direct system call use

01 Win32 API for Windows

02 POSIX API for POSIX-based systems (including virtually all versions of UNIX, Linux, and Mac OS X)

03 Java API for the Java virtual machine (JVM)

Processing of system call

1. 当用户使用系统调用时，产生一条相应的指令
2. CPU在执行到该指令时发生中断，发出有关的信号给陷入处理机构
3. 处理机构在收到了CPU发来的信号后，启动相关的处理程序去完成该系统调用所要求的功能
4. 在处理系统调用之前，陷入处理机构还需保存处理机现场（PSW、PC、系统调用号、用户栈指针、通用寄存器、用户定义的参数等）

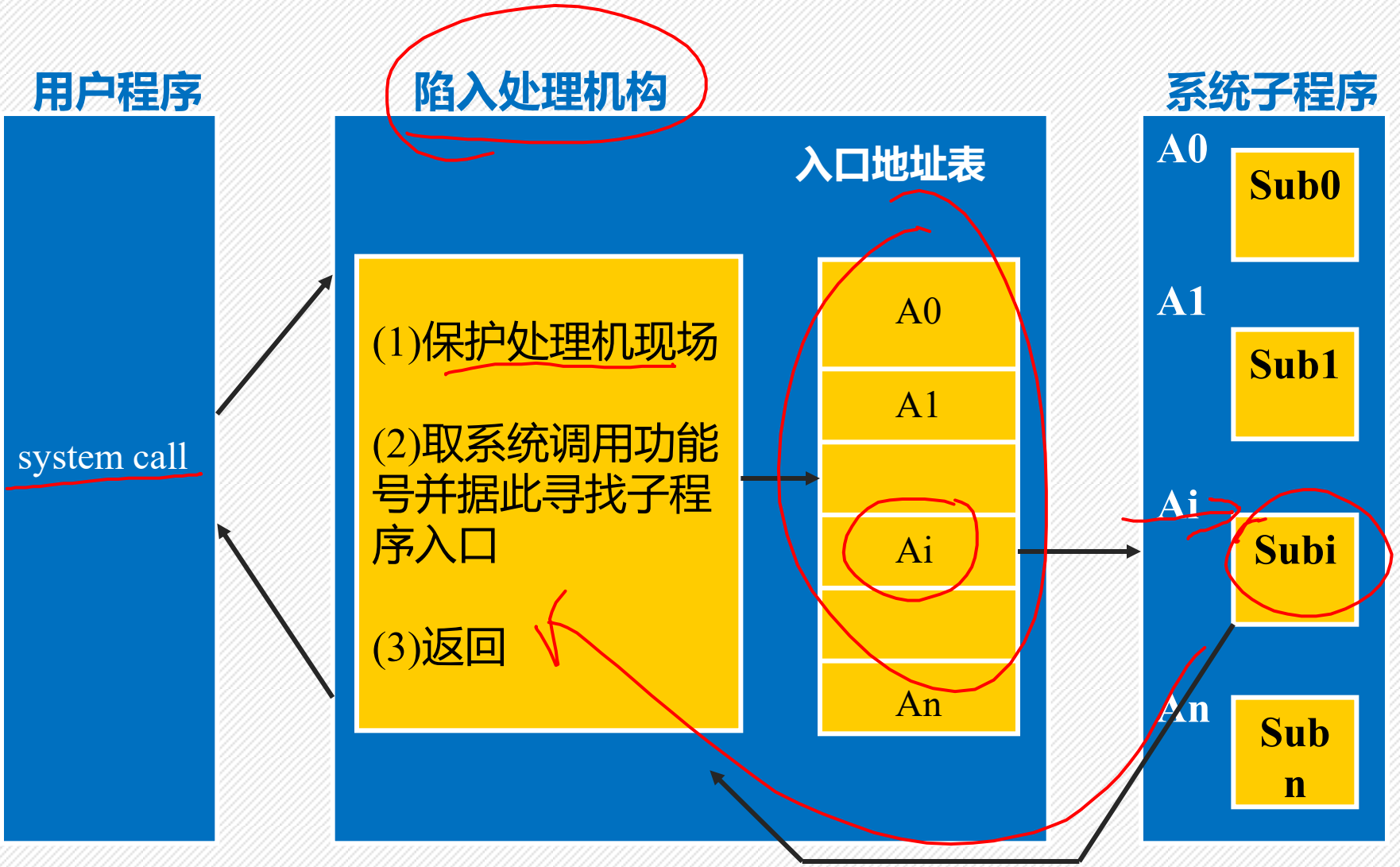
Processing of system call (cont.)

01 如何找到实现系统调用功能的子程序：入口地址表，每个入口地址与相应的系统程序对应

02 陷入处理程序用系统调用功能号查找入口地址表，得到该系统程序的入口地址，并执行之

03 系统调用处理结束后，要恢复处理机现场，从而用户程序可以继续执行

System Calls
系统调用



系统调用的处理过程

System Calls
系统调用

(How to use?)

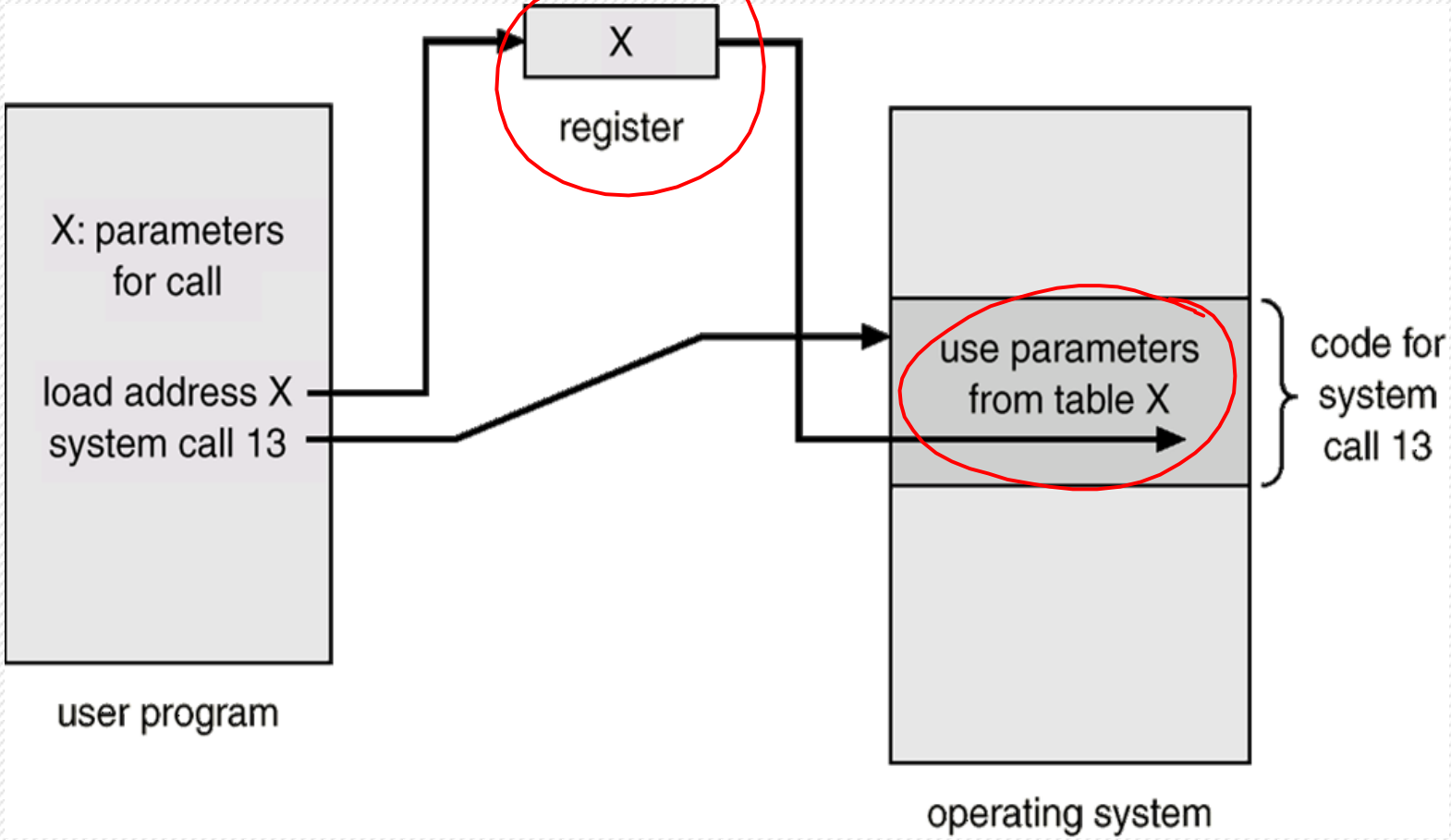
- Three general methods are used to pass parameters between a running program and the operating system.

  3种常用方式用于在运行程序和操作系统之间的参数传递

  - Pass parameters in *registers*.
    寄存器中的参数传递
  - Store the parameters in a table in memory, and the table address is passed as a parameter in a register.
    参数存在内存的一张表中，表地址作为寄存器的参数传递
  - *Push* (store) the parameters onto the *stack* by the program, and *pop* off the stack by operating system.
    程序把参数压入栈，由操作系统弹出

Passing of Parameters As A Table

表格方式的参数传递



Types of System Calls