

Part I

Virtualization

A Dialogue on Virtualization

Professor: And thus we reach the first of our three pieces on operating systems: *virtualization*.

Student: But what is virtualization, oh noble professor?

Professor: Imagine we have a peach.

Student: A peach? (incredulous)

Professor: Yes, a peach. Let us call that the *physical* peach. But we have many eaters who would like to eat this peach. What we would like to present to each eater is *their own peach*, so that they can *be happy*. We call the peach we give eaters *virtual* peaches; we somehow create many of these virtual peaches *out of the one physical peach*. And the important thing: in this illusion, it looks to each eater like they have a physical peach, but *in reality they don't*.

Student: So you are sharing the peach, but you *don't even know it?*

Professor: Right! Exactly.

Student: But there's only one peach.

Professor: Yes. And...?

Student: Well, if I was sharing a peach with somebody else, I think I would notice.

Professor: Ah yes! Good point. But that is the thing with many eaters; most of the time they are *napping* or doing something else, and thus, you can *snatch* that peach away and give it to *someone else for a while*. And thus we *create the illusion* of many virtual peaches, one peach for each person!

Student: Sounds like a bad campaign slogan. You are talking about computers, right Professor?

Professor: Ah, young grasshopper, you wish to have a more concrete example. Good idea! Let us take the most basic of resources, the CPU. Assume there is one physical CPU in a system (though now there are often two or four or more). What virtualization does is take that single CPU and make it *look like many virtual CPUs* to the applications running on the system. Thus, while each application

thinks it has its own CPU to use, there is really only one. And thus the OS has created a beautiful illusion: it has virtualized the CPU.

Student: *Wow! That sounds like magic. Tell me more! How does that work?*

Professor: *In time, young student, in good time. Sounds like you are ready to begin.*

Student: *I am! Well, sort of. I must admit, I'm a little worried you are going to start talking about peaches again.*

Professor: *Don't worry too much; I don't even like peaches. And thus we begin...*