Isolation

Q: Would you let your friend/roommate on your computer?

...system developers share the same concerns. There are many levels of increasing isolation provided by modern infrastructure:

1) Process Isolation

2) User Account Isolation

3) Containerization

4) Virtualization

<table>
<thead>
<tr>
<th>User Accounts</th>
<th>Containers</th>
<th>Virtualization</th>
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User Accounts
Every user of modern systems has a “user account”, with a default “super user account” (called `root` on Linux).

Advantages:

Disadvantages:

Containerization
Containers rely on a “Container Engine” (ex: Docker) that allows apps to interact with the host system in an isolated way.

Advantages:

Disadvantages:
Virtualization
Virtual Machines (VMs) rely on a “Hypervisor” (ex: VMWare) that allows entire operating systems to run on a host system.

Advantages:

Disadvantages:

Exploration of Different Use Cases:

1) linux.ews.illinois.edu

2) Amazon AWS EC2

<table>
<thead>
<tr>
<th>Instance</th>
<th>vCPU</th>
<th>ECU</th>
<th>Memory (GB)</th>
<th>Instance Storage (GB)</th>
<th>Linux/UNIX Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>t3.nano</td>
<td>2</td>
<td>Variable</td>
<td>0.5 GB</td>
<td>EBS Only</td>
<td>$0.0052 per Hour</td>
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<tr>
<td>t3.micro</td>
<td>2</td>
<td>Variable</td>
<td>1 GB</td>
<td>EBS Only</td>
<td>$0.0104 per Hour</td>
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<tr>
<td>t3.small</td>
<td>2</td>
<td>Variable</td>
<td>2 GB</td>
<td>EBS Only</td>
<td>$0.0208 per Hour</td>
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<tr>
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<td>2</td>
<td>Variable</td>
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<td>EBS Only</td>
<td>$0.0416 per Hour</td>
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<tr>
<td>t3.large</td>
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<td>Variable</td>
<td>8 GB</td>
<td>EBS Only</td>
<td>$0.0832 per Hour</td>
</tr>
</tbody>
</table>

3) Running PrairieLearn

4) Our Class App?