

Fast switching between operating systems using a pass-through hypervisor

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TECHNOLOGY

Talking Points

- 1 Motivation
- 2 Approach
- 3 Measurements
- 4 Future Work
- 5 Conclusion

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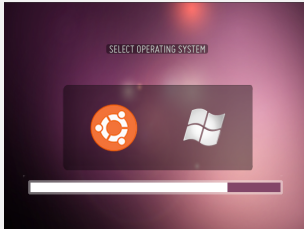
Conclusion

```

21 program :: Parser Program -- first
22 program = whitespace <&> definitio
23
24 definitions :: Parser [Loc Defi
25 definitions = definition
26             <&& ifNext (== '
27             =>> uncurry (:)
28
29 definition :: Parser (Loc Definitio
30 definition = loc $ token (fix
31             <&& typeSignature
32             <&& token (fixed
33             <&& loc expression
34             =>> \(\_, (sig, \_
35
36 typeSignature :: Parser (Loc Expression
37 typeSignature = ifNext (== 'M') mainSigna
38
39 mainSignature :: Parser (Loc Expression -> D
40 mainSignature = token (fixed "MAIN")
41             <&& token (fixed ":")
42             <&& token (loc funType)
  
```



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- multiple OSes on one computer

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- multiple OSes on one computer
- fast switching without losing our state

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- multiple OSes on one computer
- fast switching without losing our state
- eliminate or mitigate performance issues

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- multiple OSes on one computer
- fast switching without losing our state
- eliminate or mitigate performance issues
- eliminate hardware issues

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- multiple OSes on one computer
- fast switching without losing our state
- eliminate or mitigate performance issues
- eliminate hardware issues
- do not modify the OSes

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OS1



Approach

- to switch between multiple OSeS, we need multiple OSeS



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- to switch between multiple OSES, we need multiple OSES



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- to switch between multiple OSES, we need multiple OSES
- a virtualization layer grants us control over the hardware



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- to switch between multiple OSES, we need multiple OSES
- a virtualization layer grants us control over the hardware
- OSES expect certain memory regions



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- to switch between multiple OSES, we need multiple OSES
- a virtualization layer grants us control over the hardware
- OSES expect certain memory regions
- the OSES have to handover their devices



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- to switch between multiple OSES, we need multiple OSES
- a virtualization layer grants us control over the hardware
- OSES expect certain memory regions
- the OSES have to handover their devices
 - use suspend-to-RAM (S3 sleeping state)



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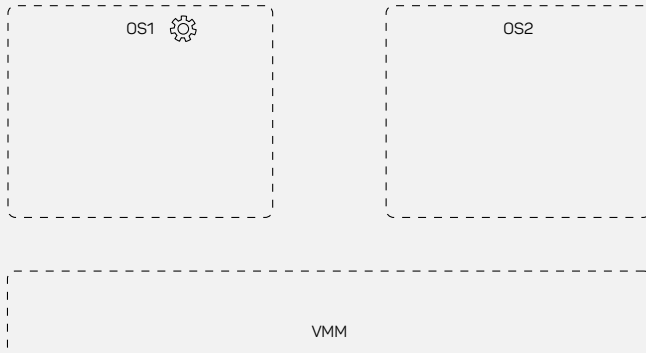
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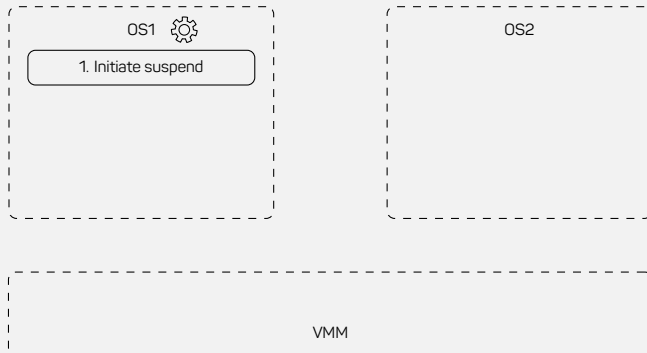
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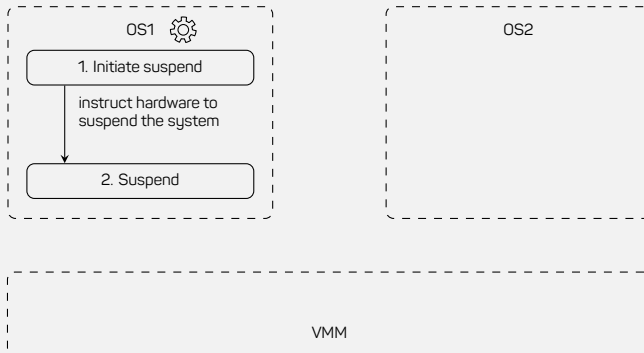
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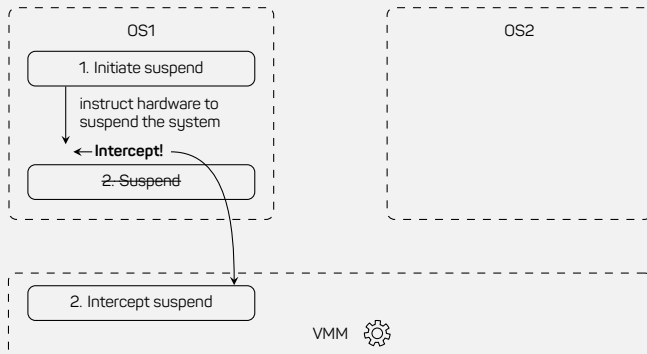
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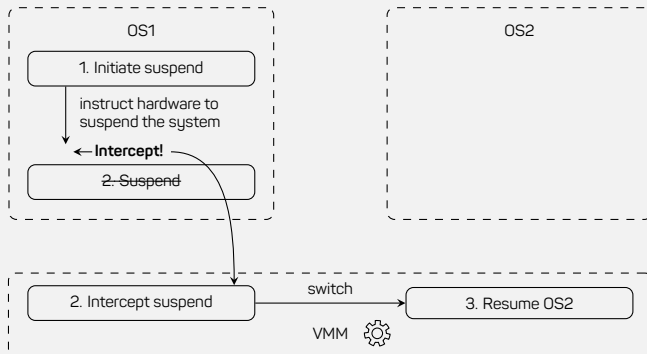
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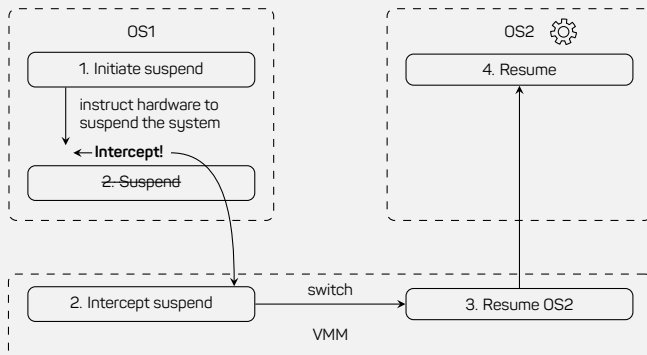
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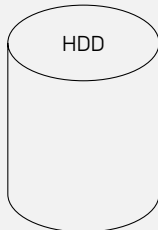
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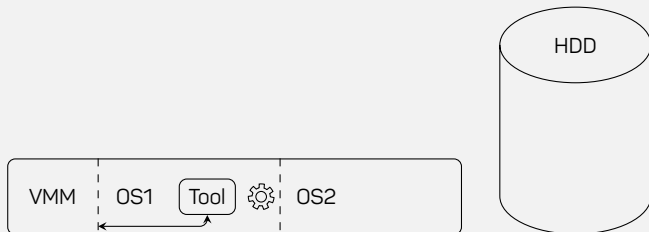
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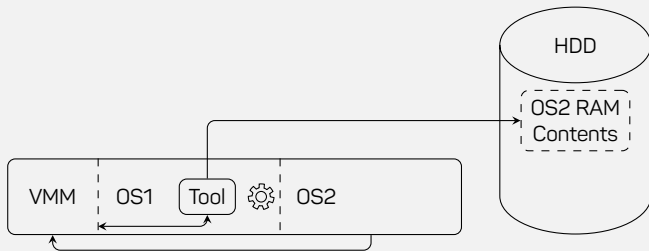
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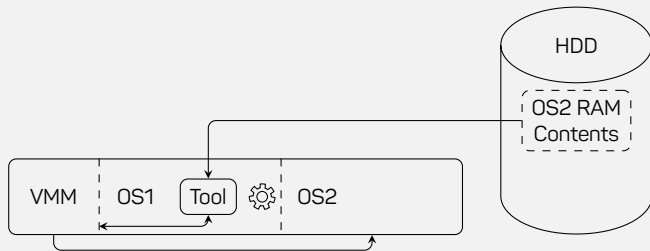
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Measurements

Windows to Linux



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Linux to Windows



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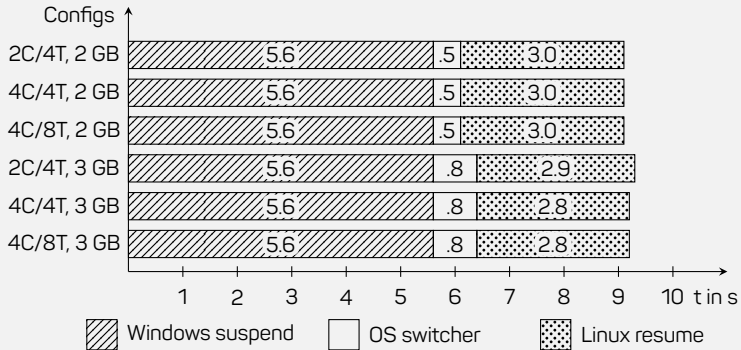
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Windows to Linux



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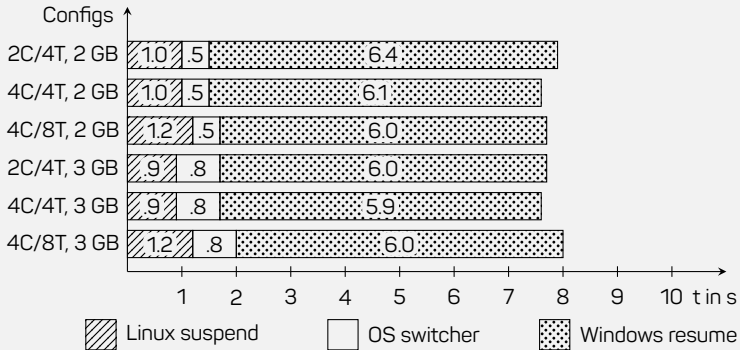
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Linux to Windows



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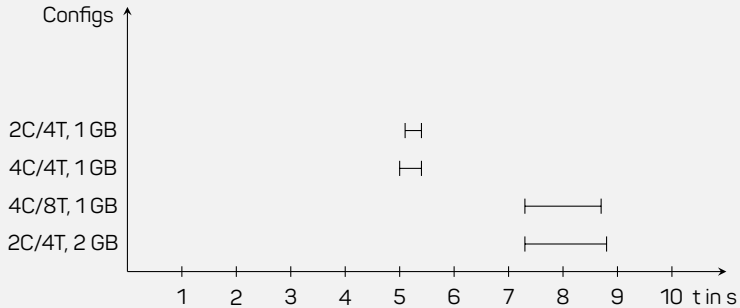
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Linux to Windows



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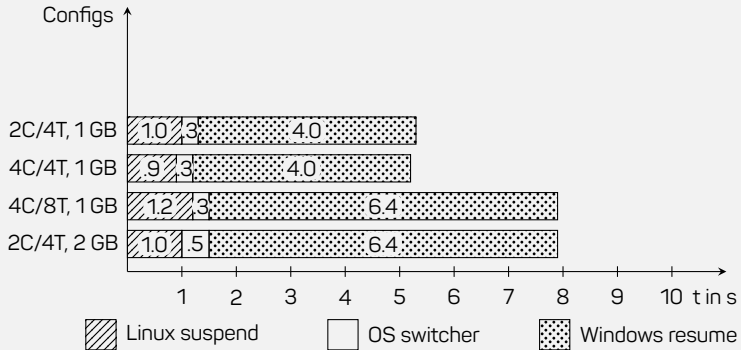
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Linux to Windows



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- limitations
 - switching time increases with available memory

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- limitations
 - switching time increases with available memory

- suggestions for future hardware
 - **each** device needs two functions that can be invoked using MMIO
 - `store_configuration`
 - `read_configuration`

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Summary

- developed and implemented the OS switcher
 - use ACPI to avoid issues with device state management
 - use NOVA and SuperNOVA to intercept and control the guests

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Summary

- developed and implemented the OS switcher
 - use ACPI to avoid issues with device state management
 - use NOVA and SuperNOVA to intercept and control the guests
- switch between OSes in under 10 seconds
- switching works reliably on the tested hardware

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