Catchin' the Plague

Building an Operating System for Viruses

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Is your OS sick? Good!

- Let's embrace the beast
  - If you can't beat 'em, join 'em

- Viruses are powerful software
  - We can learn from them

- Stop spending on Anti-Virus software
  - And buy yourself a bigger monitor
Why you should love Viruses

• Viruses are easy to install.
  – No searching and downloading – Viruses seek you out!

• Viruses are easy to manage.
  – New machine? Virus found you on Facebook!

• Viruses are highly available.
  – No Internet? It'll try Bluetooth! Or USB sticks!

• Viruses are highly resilient.
  – Wipe your disk today, it's back tomorrow!
An OS for These Lovable Devils

“Harness the virus”

- Assume all apps are viruses, or vapps
- Assume vapps propagate relentlessly
- Assume vapps consume all the resources they can

Any OS can adhere to these principles:

Virix

SMaCOS (Serving Malloc Continuously)

OpenBSD (Befriending Several Diseases)

Act now, domain squatters are quick!
But what does a viral OS actually look like?
Meet Alice and Her Computer

Alice is a vampire.

Her OS implements the viral philosophy.

She has a public profile of vapps.
Hi, My Name is... Infection

1. Alice and Bob are in the same room at OSDI 2010.

2. Their viral OS devices find and infect each other.

3. Bob acquires Alice's public vapps

4. The PDA automatically executes Alice's vapps.

Vapps are easy to install!

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In the Company of Friends

1. Later, Bob remembers her face, but not her name.

2. Bob checks the vapps he acquired at OSDI 2010.

   - Fred
   - Carl
   - Alice

   "Email Me!", "Skype Me!", "Bite Me!"

3. Bob can only VoIP Alice between 9pm – 5am.

4. at 1:03PM

   “Hey, I'm unavailable, but would you like to donate blood?”

Vapps are easy to manage!

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It just keeps going and going and...

1. On a camping trip, Alice creates a photo vapp.

2. Even without Internet, Bob and others acquire the vapp.

3. Alice adds photos constantly.

4. Bob and others receive the photos automatically.

Vapps are highly available!

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Have you seen my... Vapps?

1. Alice loses her computer on the camping trip.

2. Fortunately, all her vapps have propagated to her friends' machines.

3. She only needs to become re-infected from those machines.

Vapps are highly resilient!

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Some Minor Issues (yawn)

- Viruses steal information
- Viruses steal resources
- Viruses break the OS
- Viruses break applications

But we already have techniques for handling these issues:
- Code Sandboxing
- Information Flow Control
- Resource Control

*We say these technologies offer us transparency and control.*
Moving on... Keepin' Secrets

1. A bloodbank hires Alice as collection agent.

2. She creates a **private** profile of company vapps.

3. IFC techniques quarantine private vapps under the developer's policy.

4. The “SSN-to-Bloodtype” vapp propagates only to authorized machines.

*Viral OS has transparency!*

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Separation of State & Church

1. On vacation, Alice acquires a State Tourist vapp.

2. Vapp has access to CPU, storage and network.

3. Alice falls in love & marries Charlie.

4. His vapps can access Webcam, GPS, etc.

Viral OS has control!
The VappStore: An Economy of Viruses
Business Models

Advertisement-Driven Model

- Successful examples abound on the Internet

Producer/Consumer Model

- Example #1

Quid Pro Quo Model

- Example #2
1. Alice visits Vapps4Vamps.com

2. Alice buys two *personalized* vapps.

3. Others run her *custom* vapps for free.

4. But Charlie must pay for his own *customized* vapps!
Quid Pro Quo Model

1. Alice contracts the Weather Vapp for free online.

2. She can use the vapp as often as she likes... … but she must upload a daily temp. with her iPhone's thermometer.

3. This model is widely applicable and offers many interesting cases!
Conclusion

- Stop Hating on Viruses

The world would be a better place if:
- All applications behaved like viruses
- All Oses expected them to.
Thank You!

Questions?
Thoughts and Issues

- How does one program a vapp?
  - Is there an API?

- Can you scale on network input and user input?
  - Cloud-esque increase of propagation on-demand

- What happens when the developer wants to remove its vapp from Alice's machine?

- Updating a vapp requires decoupling of code and data

- If I'm watching a video, I don't want anything else to run.