Web Security

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Mid-term Questionnaire Summary (I)

- **Optional readings**
  - **You don't have to read them**
- **Paper summaries**
  - **Should not take too much time**
  - **No homeworks, so load is balanced**
  - **Bullet form is ok**
  - **Due before class?**
  - **Summaries on-line?**
  - **Feedback on summaries?**
  - **Readings will be reduced in 2nd half of semester**
    - **Give time for project**
- **Speed**
  - **People have diverse background, so it's difficult to satisfy everyone at the same time**
  - **Thanks for understanding**

Mid-term Questionnaire Summary (II)

- **Guest lecture**
  - **Many students really like the idea**
  - **We'll have a few more guest lectures**
  - **Would have liked more discussions:**
    - **Prepare your questions**
- **Discussions**
  - **Many find exciting & insightful**
  - **More people need to participate!**
    - **No pressure**
    - **Don't be shy :)**
    - **Try to contribute with your thoughts/questions**
    - **Try to bring your comments to OpenMic**
- **Students select topics**
  - **Let me know & we'll try to accommodate if there's time**

Project Proposal

- Mostly fine with topics
  - Scott & Craig: come see me after class
- Many lack timeline
  - Include timeline & resubmit by Oct 22
- Milestone: due Nov 14
- Poster sesion: Dec 6, 2:30-4:30pm
  - In conjunction with CS261

Browser-OS Analogy

- OS
  - Resource management
  - Layer of abstraction
  - Isolation
- Browser-platform
  - What resources does browser-platform manage?
    - » OS analogous?
  - What abstractions does browser-platform provide?
    - » OS analogous?
  - What properties should browser-platform ensure?
    - » OS analogous?

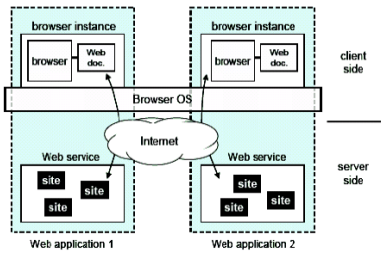
Straw-man Approaches

- VMWare Web browser appliance
  - A check-pointed image of Firefox browser on Linux
  - Disadvantages?
- What about running each URL in a separate VM?

Tahoma Architecture

- **Trust model & principles**
  - **Web applications should not be trusted**
    - » **Web application = Browser instance + web services**
    - » **Isolation: each browser instance in VM**
  - **Web browsers should not be trusted**
    - » **Isolate browsers from rest of the system**
    - » **Network policy & reverse firewall**
  - **Increase visibility & control over downloaded web applications**
    - » **Web applications should be visible to users like desktop applications**

Tahoma Architecture



Manifests

- **Tahoma web applications are first-class objects**
  - **Explicitly defined & managed**
- **Manifests**
  - **Digital signatures authenticating web service**
  - **Browser policy: code to run in browser instance**
  - **Network policy: internet access policy to be enforced by reverse firewall**
- **A paradigm for mobile code**
  - **Signature + code + sandbox policy**

Browser Operation System (BOS)

- TCB for Tahoma browsing system
- Multiplexes virtual screens of each browser instance into physical display
  - Trusted border
- Enforce network policies for each instance
- Store state for associated browser instance
  - Bookmarks, manifests
- Inter-application communication
  - Fork, BinStore, BinFetch

Tahoma Implementation

- Xen VMM in Linux
- BOS, BOS Kernel & tiny proxy implemented as domain0 VM
- Browser instance run on Xen VM
- Window manager aggregates virtual screens on physical screen
- Browser modifications
  - Linking to libQT to access Tahoma graphics subsystems
  - Using browser-call to access remote services
  - Using browser-call for new functions, e.g., fork

Discussions

- Advantages of Tahoma
  - What common attacks does Tahoma prevent?
- Disadvantages of Tahoma?
  - What kinds of attacks does Tahoma fail to prevent?
- How does Tahoma compare with SFI/XFI?
- Does Tahoma provide a trusted-path btw user & web service? Why?

Open Mic

- Anything else you thought that's really clever in the papers?
- Anything else you didn't like about the papers?
- Any other unclear points about the papers?
- Other comments/remarks to share?

Summary

- BrowserOS
- Next class:
  - Mashup OS
  - XSS