Security Assurance for Web Device APIs

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The Problem

- Web servers want access to very sensitive devices
- There is a history of trouble in this space
- We need a *high-assurance* guarantee that the implementation is correct
- We need a *high-assurance* guarantee that the user understands what is happening
- What are the design principles for any API spec, given that we cannot rely on bug-free code or bug-free users?

Usability Principles

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Usability Principles
Isolation Principles
Device Categories
High-Assurance Implementation
Failures. . .

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   User must see what access is authorized

Isolation Principles

- Must give implementors (and users) confidence that the system will behave properly
- Secure across software upgrades
- Secure against new, unforeseen devices
- System must "fail secure"

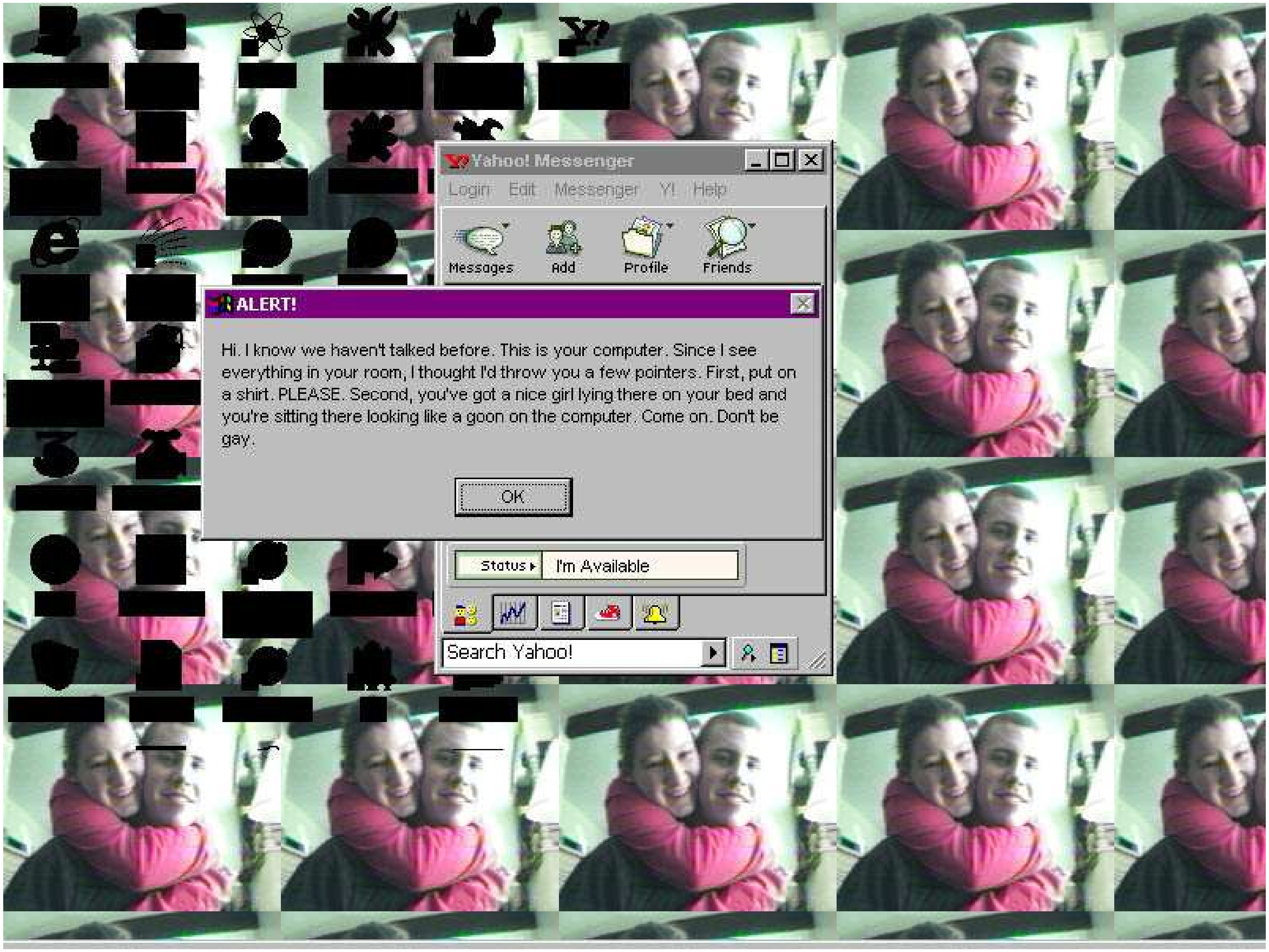
Device Categories

- Devise categories: PHYSICAL WORLD, PRIVACY, etc.
- Assign each device to a category
- New devices *must* be in a category to be used; forces a decision
- Grant or withhold permission based on at least category; simplifies user decision process

High-Assurance Implementation

- (Unix-style solution; Windows is similar)
- Create a group for each category; assign devices to the proper group with permission 060 (group read/write; no others)
- To enable a ⟨category,device⟩, create a setgid program executable by only that user but setgid to the category's group
- No page interpretation failure can access an unauthorized device (though erroneous web pages can)

Failures. . .



Hi. I know we haven't talked before. This is your computer. Since I see everything in your room, I thought I'd throw you a few pointers. First, put on a shirt. PLEASE. Second, you've got a nice girl lying there on your bed and you're sitting there looking like a goon on the computer. Come on. Don't be gay.