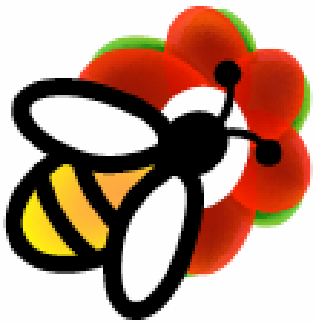
Honey@home



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A few words about NoAH

- Network of Affined Honeypots
- EU-funded 3 year project (2005-2008)
- Develop an infrastructure to detect and provide early warning of cyberattacks
- Gather and analyse information about the nature of these attacks
- More info at http://www.fp6-noah.org

Outline

- Introduction
- Motivation
- Honey@home
- Architecture
- Challenges and how to face them

What are honeypots?

- Computer systems that do not provide production services
- Listening to unused IP address space
- Intentionally made vulnerable
- Closely monitored to analyse attacks directed to them
- Usually run inside a containment environment
  - Virtual machines

Motivation (1/2)

- There is unused IP address space
  - Large universities and research centers
    - UCSD , allocated a /8, only few thousands used
    - FORTH
    - CSD

    } Allocated a /16 each utilization under 40%
  - Organizations and private companies
  - Public domain bodies
  - Upscale home users
  - NAT-based home networks
    - 192.168.*.*

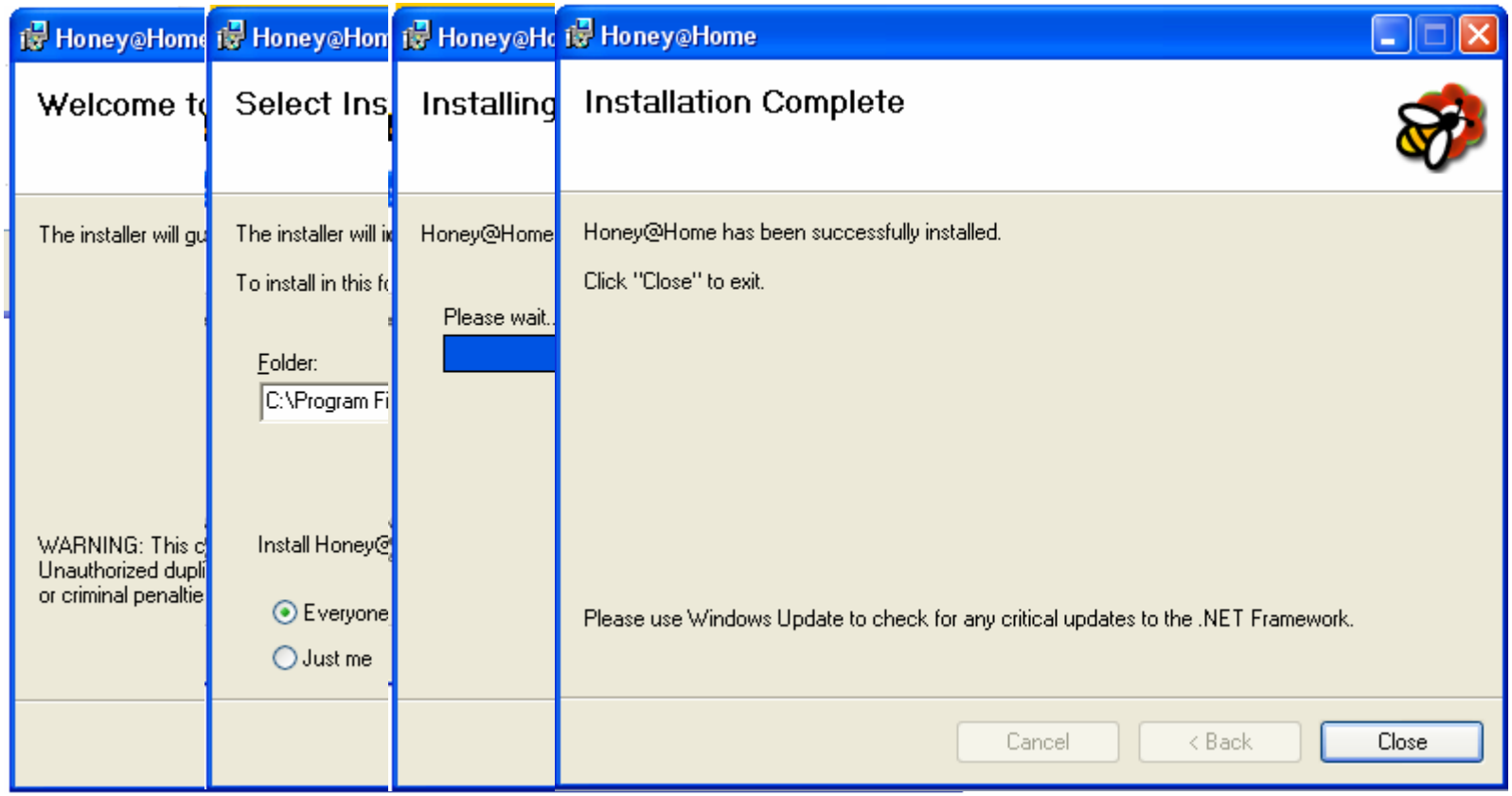
Motivation (2/2)

- Social aspect
  - **Empower the people**
  - With minimal installation overhead
  - Minimal runtime overhead
- Appropriate for organizations
  - Who want to contribute
  - But do not have the technical knowledge
    - To install/maintain a full-fledged honeypot

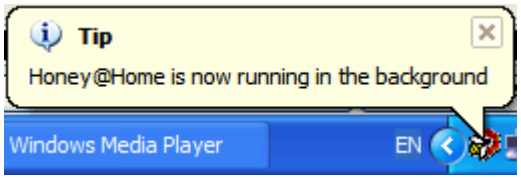
Honey@home

- Enables willing users and organizations to effortlessly participate in a distributed honeypot infrastructure
  - No configuration needed, install and run
  - Both Windows and Linux platforms
- Runs in the background, sends all traffic from the dark space to NoAH core for processing
- Attacker think they communicate with a home computer but actually talks with honeypots

Install…

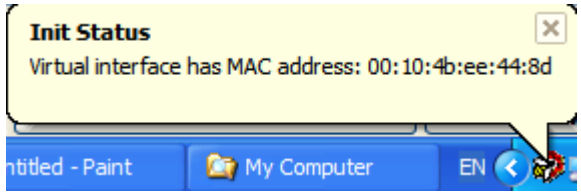

Honey@Home
Welcome t
The installer will gu
WARNING: This c
Unauthorized dupli
or criminal penaltie
Honey@Hom
Select Ins
The installer will i
To install in this f
Folder:
C:\Program Fi
Install Honey@
Everyone
Just me
Honey@Hc
Installing
Honey@Home
Please wait...
Honey@Home
Installation Complete
Honey@Home has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

…and run



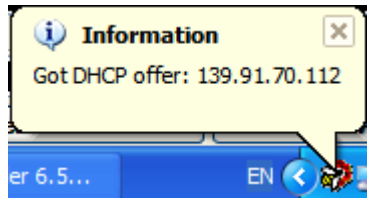
1

Running at the background



2

Creating a new virtual interface

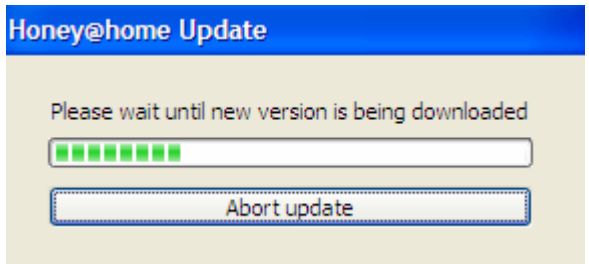


3

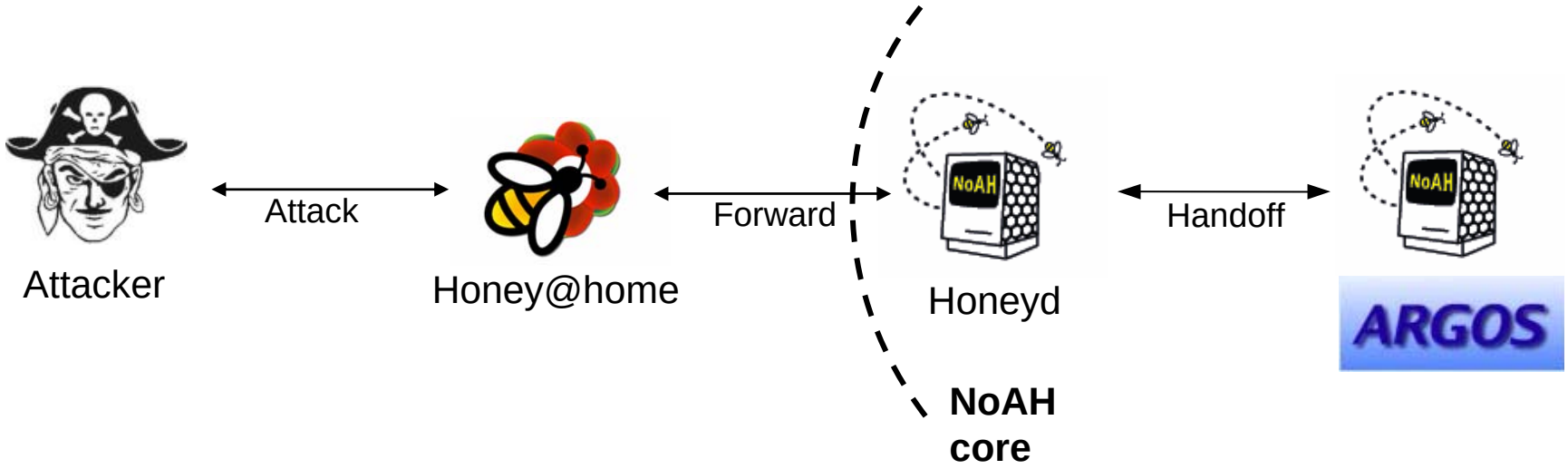
Getting an IP address from DHCP server

Features

- Can obtain address from DHCP or statically
- BPF filters can be used
  - Useful to get traffic from the whole unused subnet
- NAT detection and automatic port forwarding
  - Mostly for DSL users and small enterprises that are behind NAT
- Graphic overview of traffic statistics captured by the client
- Automatic updates



Backend architecture



- Honey@home clients connect to NoAH core
- Honeyd as front-end to filter out scans
  - Filters out scans and unfinished connections
- Honeyd hands off connection to Argos
- Argos is an instrumented virtual machine able to catch zero-day exploits
  - Detects when code coming from the network is executed
  - http://www.few.vu.nl/argos/

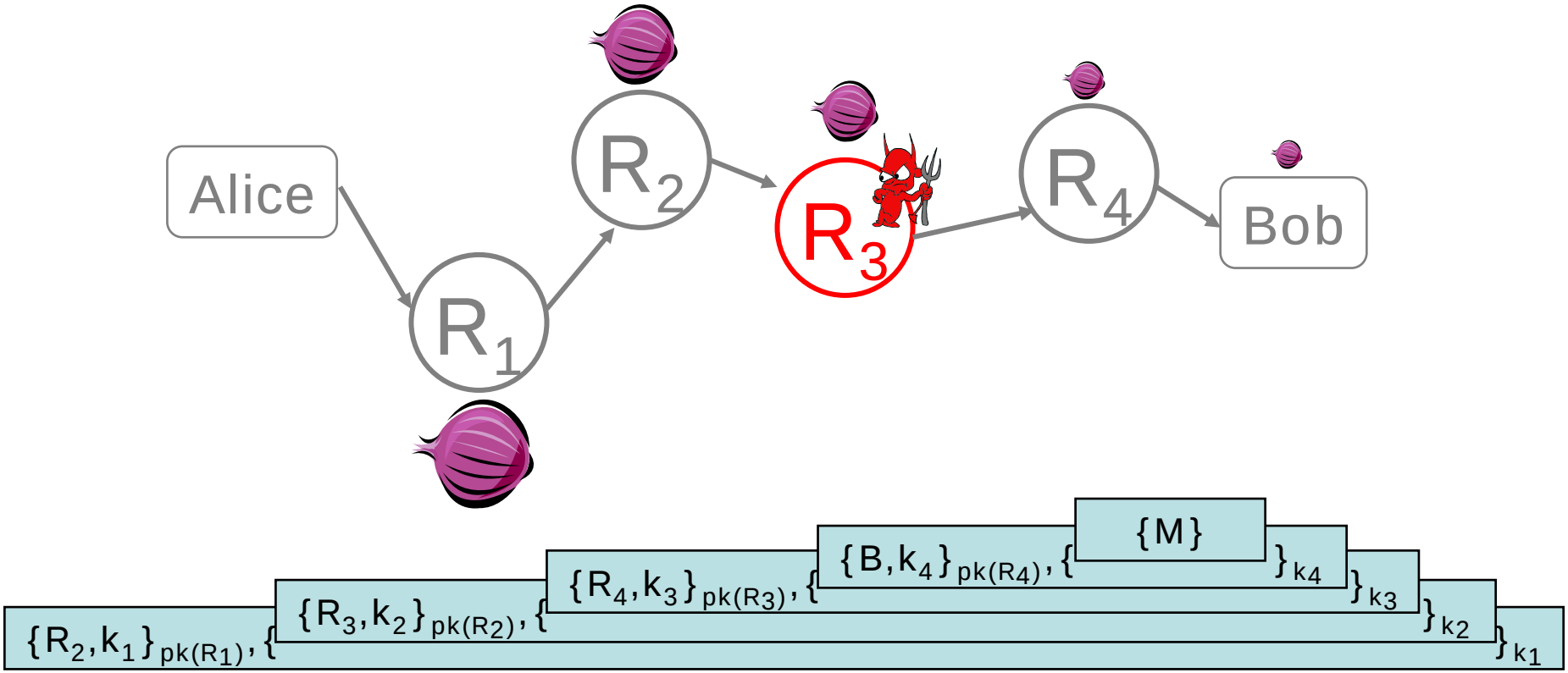
Challenges

- We cannot trust clients
  - Anyone will be able to set up honey@home
- Clients must not know the address of honeypots
  - Honeypots may become victims of direct attacks
- Addresses of clients must also remain hidden
  - Attacker can use their black space for flooding
  - Or blacklist them to make NoAH core blind
- Computer-based mass installation of honey@home mockup clients should be prevented

Hiding honeypots and clients

- Use of anonymous communication system
- Onion routing is an attractive solution
  - Prevents eavesdropping attacks
  - Based on a set of centralized nodes (onion routers)
  - Even when a router is compromised, privacy is preserved
- Tor, an implementation of second generation onion routing

How onion routing works

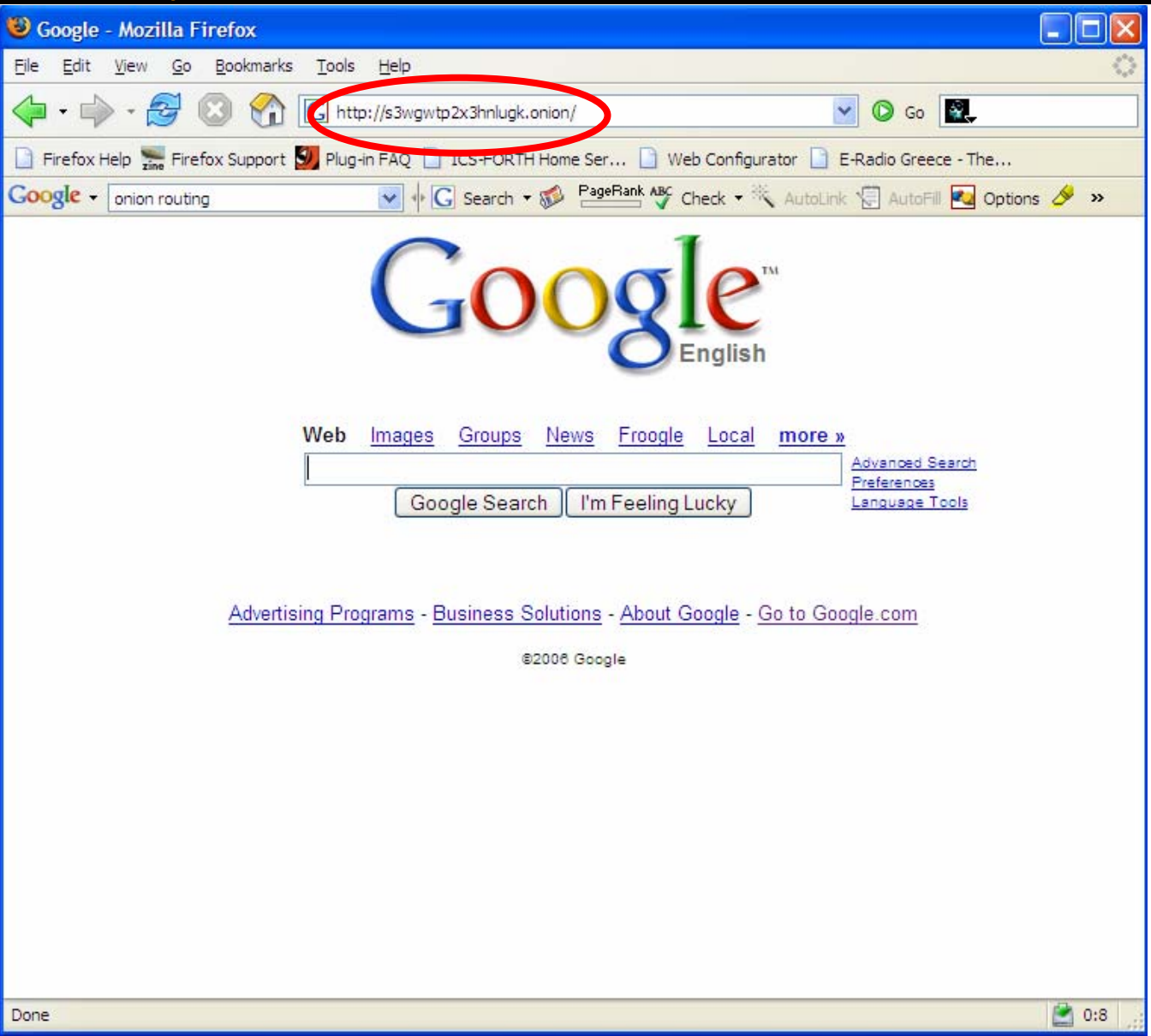


- Sender chooses a random sequence of routers
  - Some routers are honest, some controlled by attacker
  - Sender controls the length of the path
- Routing info for each link encrypted with router's public key
- Each router learns only the identity of the next router

Hidden services

- In previous examples, Alice needed to know the address of Bob
  - That is client needs to know the address of honeypots
  - **We need to hide our honeypots**
- Tor offers hidden services
  - Clients only need to know an identifier for the hidden service
  - This identifier is a DNS name in the form of “xyz.onion”
  - “.onion” is routable only through Tor

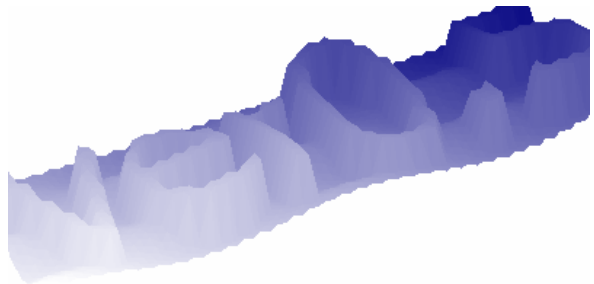
Hidden services in action



- We created a hidden service that actually forwards to Google.com

Preventing automatic installation

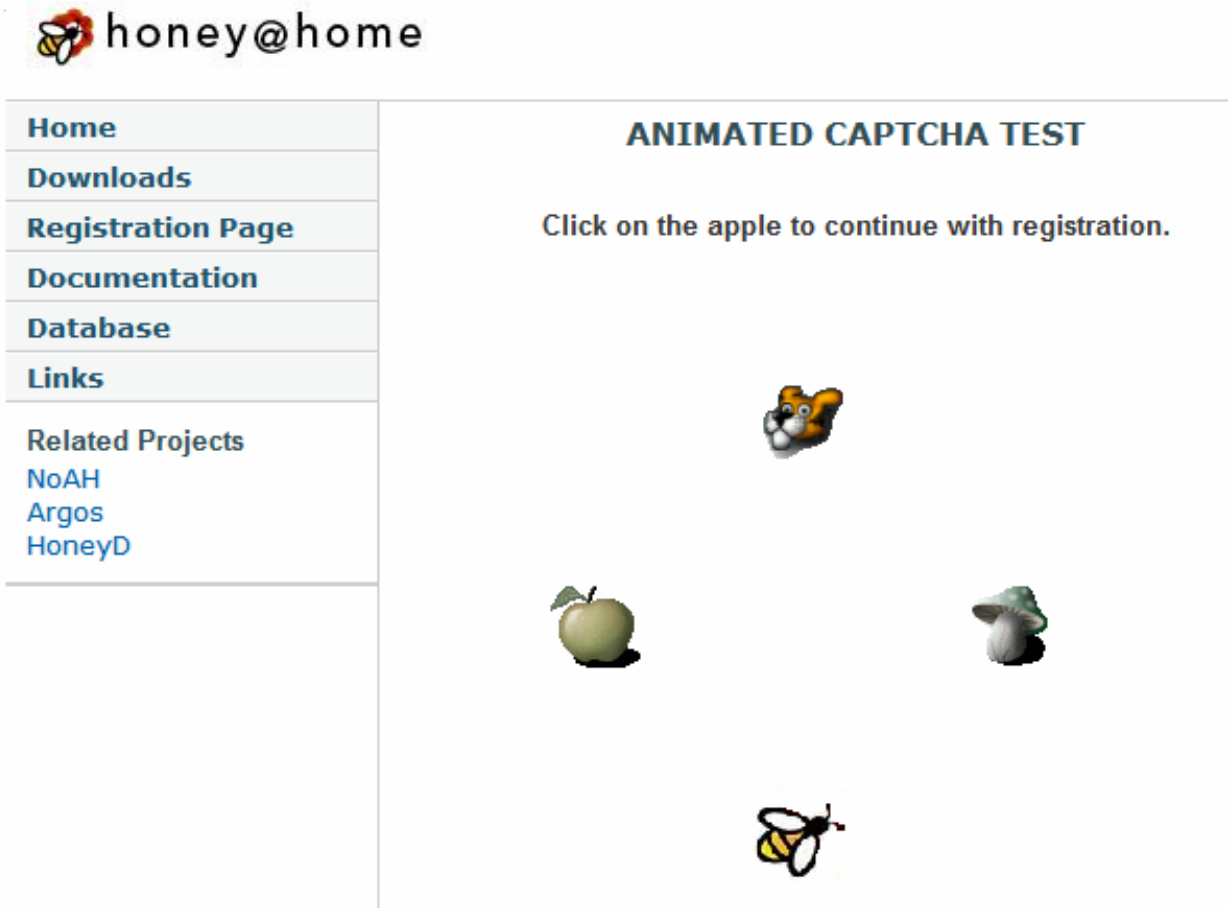
- Goal: prevent attacker from deploying clients to its botnet
- CAPTCHAs as a proposed solution
  - Instruct human to solve a visual puzzle
  - Puzzle cannot be identified by a computer
  - Puzzle can also be an audio clip



Enhancing CAPTCHAs

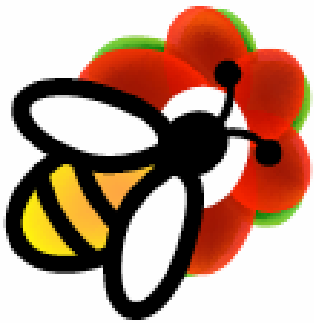
- Attacker may post the image to his site and use visitors to solve it
- Adding animation to avoid “CAPTCHA” laundry
- User clicks on the correct (animated) answer to continue with the registration
  - Animation prevents users to provide static responses, like “I clicked the upper left corner”
- We use the Java applet technology

Enhancing CAPTCHAs



Questions?

Honey@home



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