Organizing Large Scale Hacking Competitions

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Outline

- Hacking Competitions Overview
- UCSB's iCTF
  - History
  - 2003-2007 Competitions
  - 2008 Competition
  - 2009 Competition
  - Lessons Learned
- Final Remarks

HACKING COMPETITIONS OVERVIEW

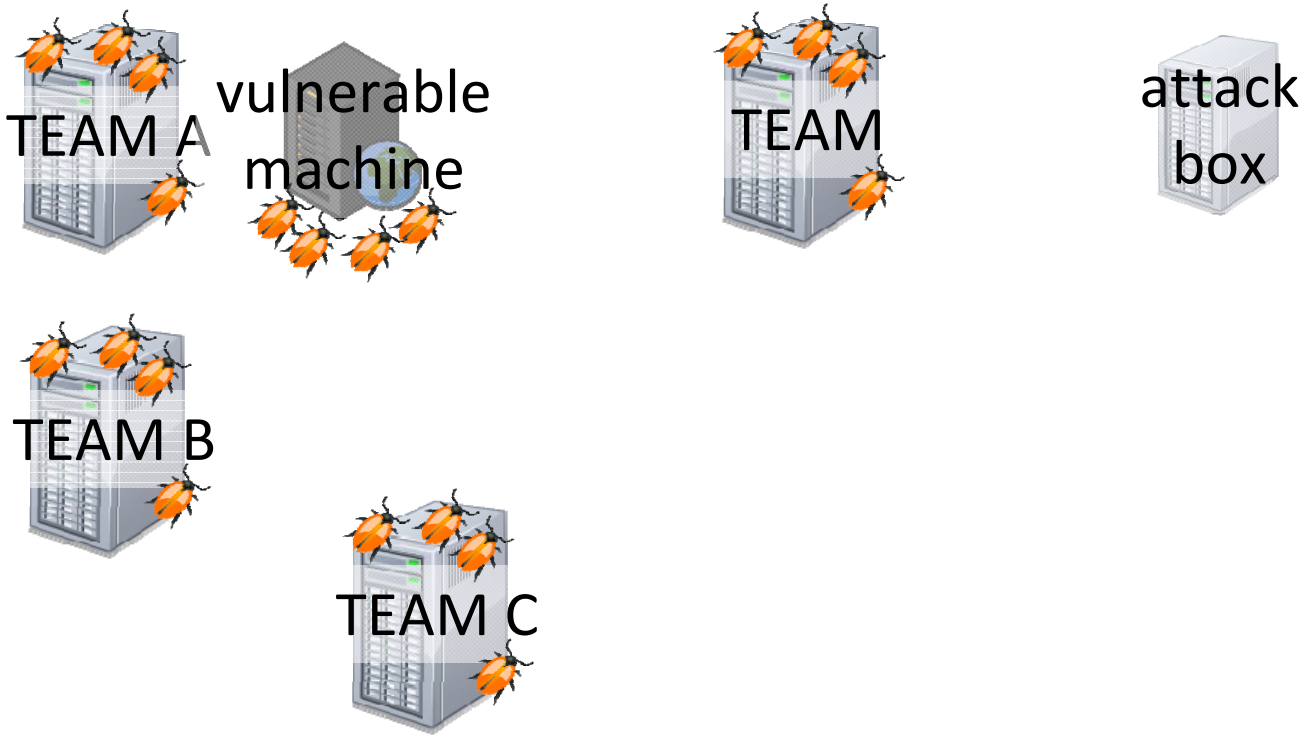
Why a hacking competition?

- Time constrained
- Provides hands-on security experience
- Mimics real-world scenarios
- It's fun
  - Engaging
  - Motivates students to go beyond the call of duty
  - Promotes participation

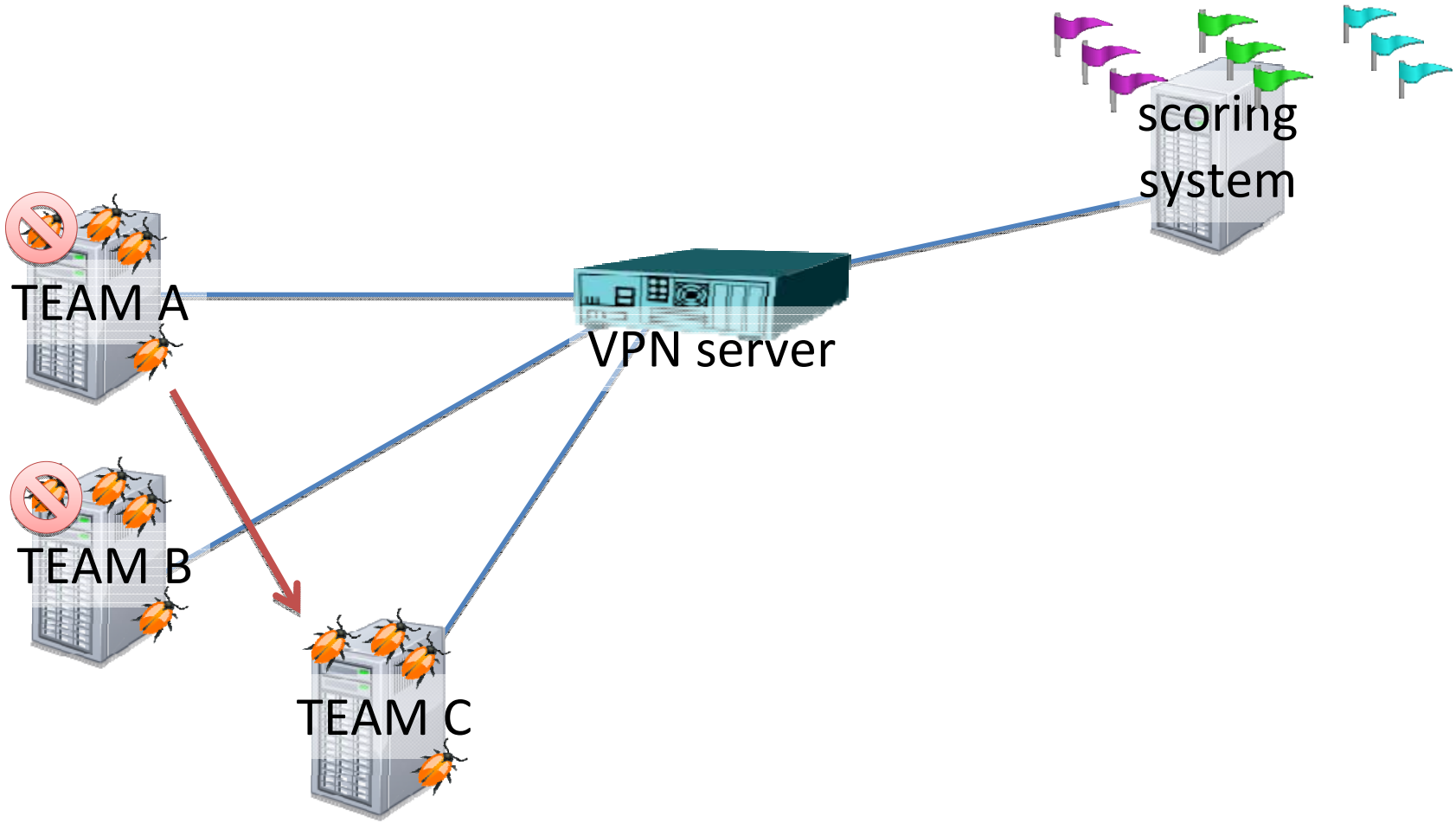
Types of hacking competitions

- Challenge based
  - DEFCON Quals, Codegate
- Capture the flag
  - DEFCON, **iCTF 2003-2007**, CIPHER, RuCTF

2003-2007 iCTF example



2003-2007 iCTF example



Types of hacking competitions

- Challenge based
  - DEFCON Quals, Codegate
- Capture the flag
  - DEFCON, **iCTF 2003-2007**, CIPHER, RuCTF
- Attack based
  - Pwn2Own, **iCTF 2008-2009**
- Defense based
  - Cyber Defense Exercise (CDX)
  - NSF Security Grand Challenge

Hosting a hacking competition

- Design
  - Challenging but not frustrating
  - Cater to various abilities
  - Be objectively scored
- Development
  - Allocate ample time
- Execution
  - Maintain and monitor network
  - Support remote teams
  - Limited timeframe

UCSB'S INTERNATIONAL CAPTURE THE FLAG COMPETITION

iCTF History

- 2003: 14 US university teams
- 2004: Addition of European teams
- 2005: Addition of more international teams
- 2006: 25 teams
- 2007: 36 teams
- 2008: 39 teams
- 2009: 56 teams

2003-2007 Competitions

- Traditional CTF format with side challenges
- Limited to universities
- Addition of remote teams
- Introduced traffic blending technique

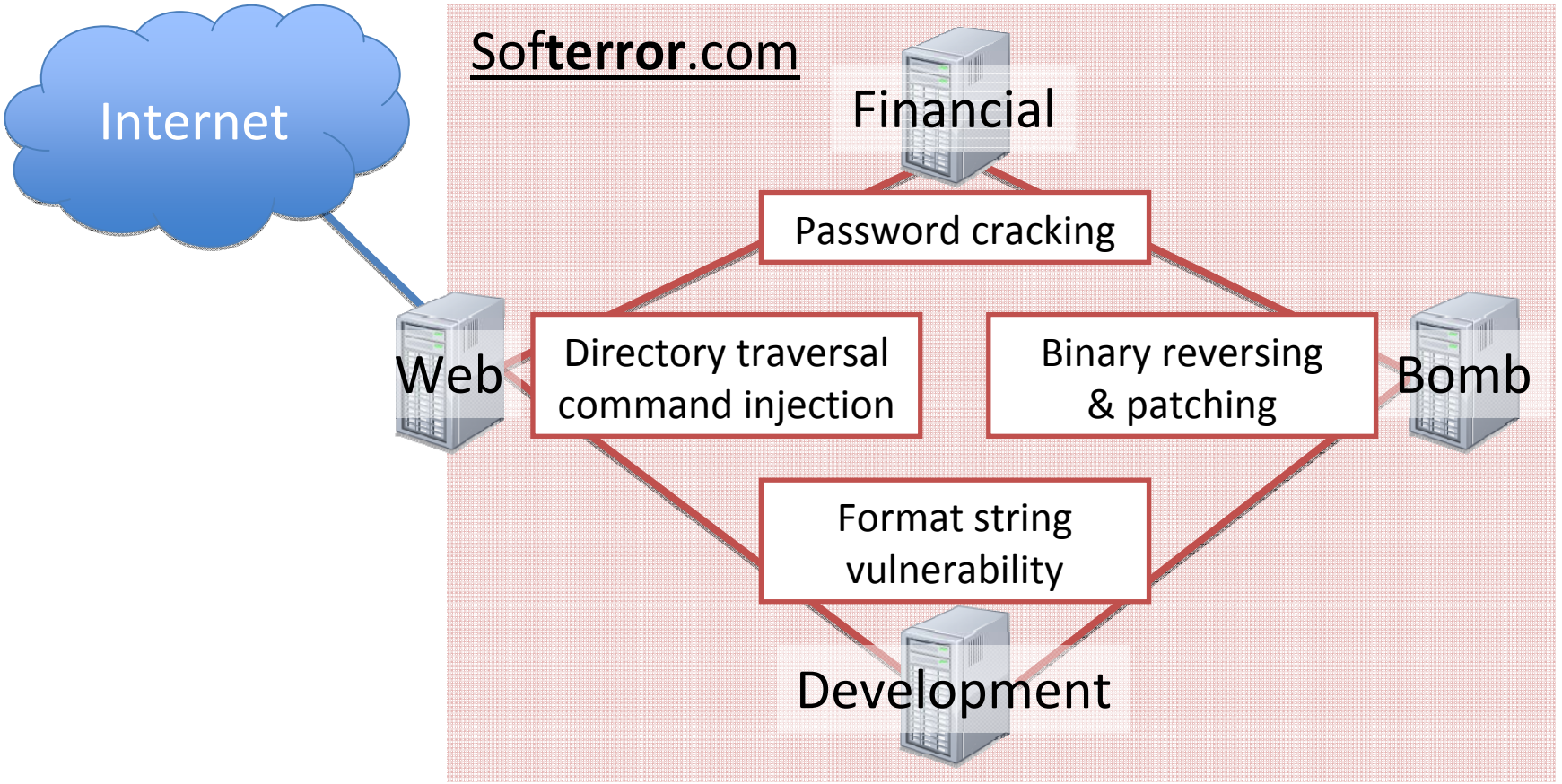
Limitations

- Favored experienced teams
- No longer unique

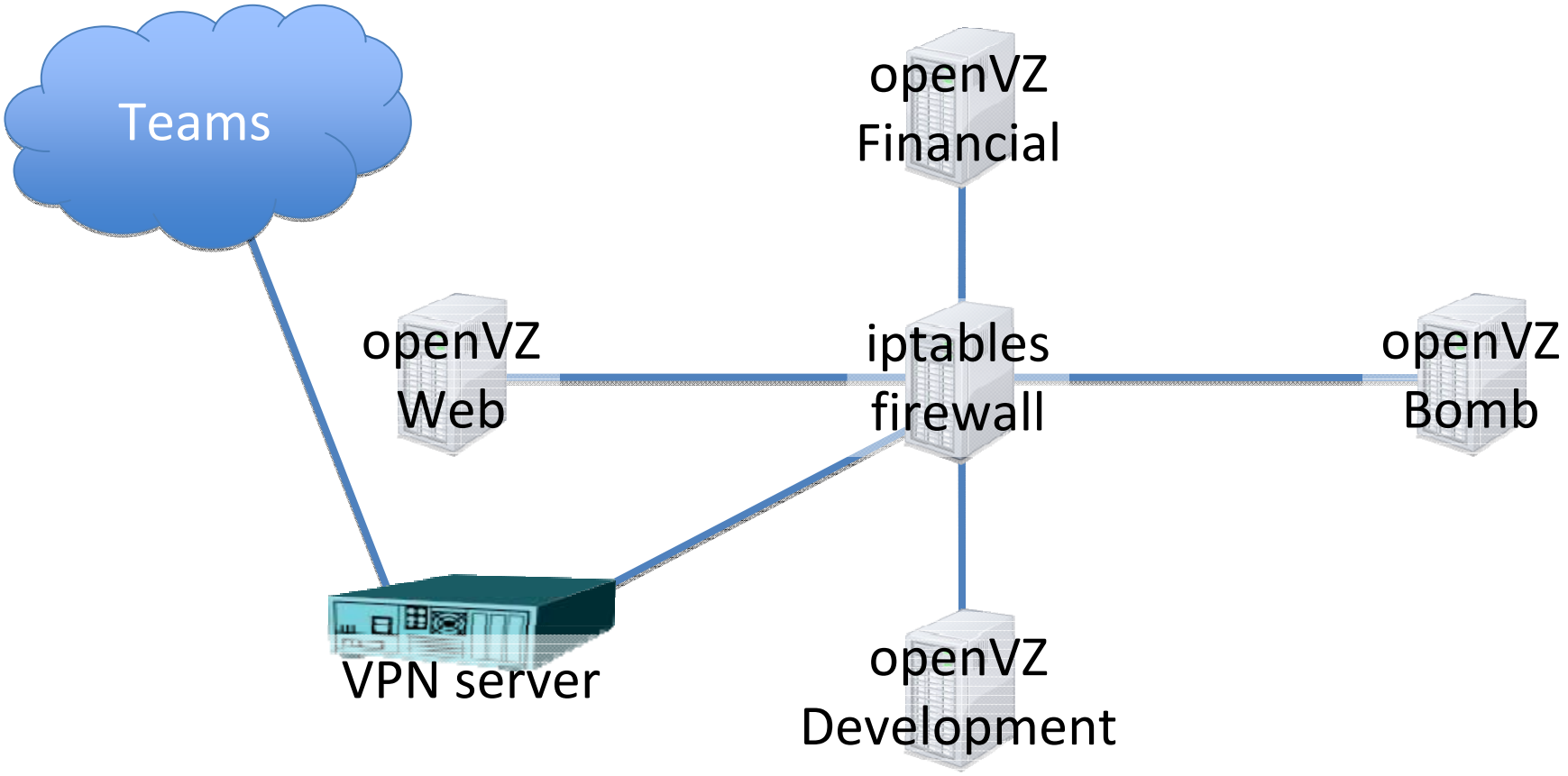
2008 iCTF

- Attack-based with side challenges
- Mimics a “save the world” scenario
- Goal: Defuse bomb by breaking into the sof**terror**.com network

2008 Simulated Network



2008 Physical Network



2008 Dataset

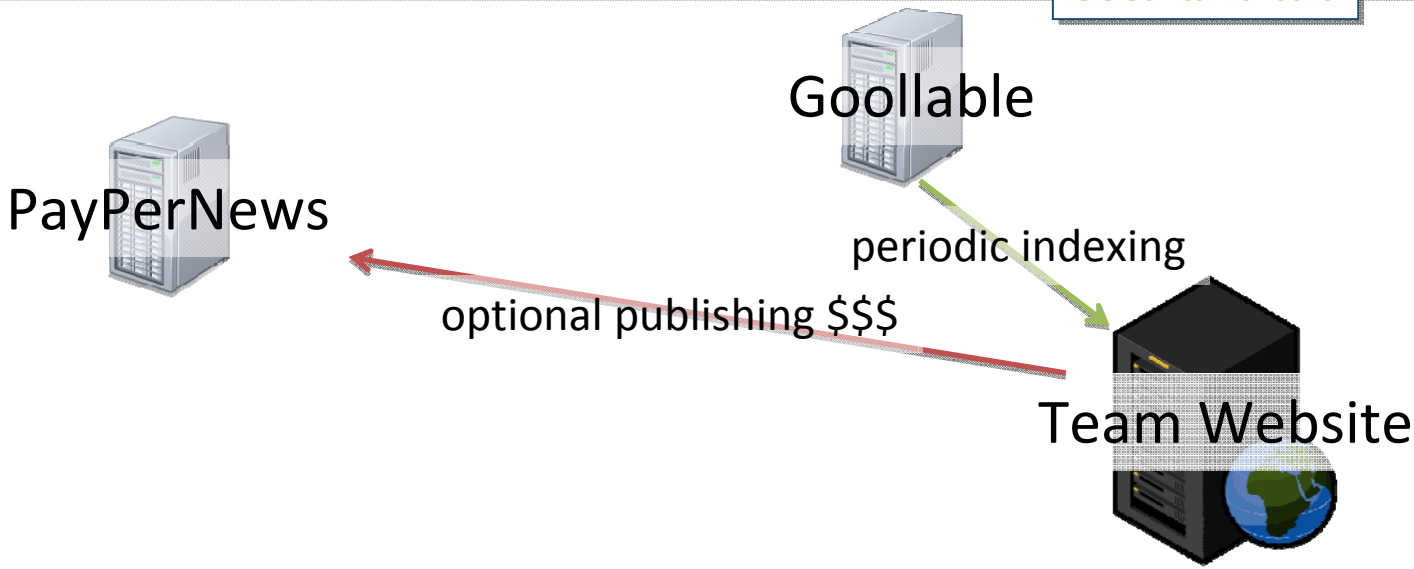
- Snort Alerts (by team)
  - Mean: 8482
  - Max: 43254
- Pcap files
  - 5.5 GB data (3 GB compressed)
  - 34 million packets
- Useful for attack correlation research

2009 iCTF

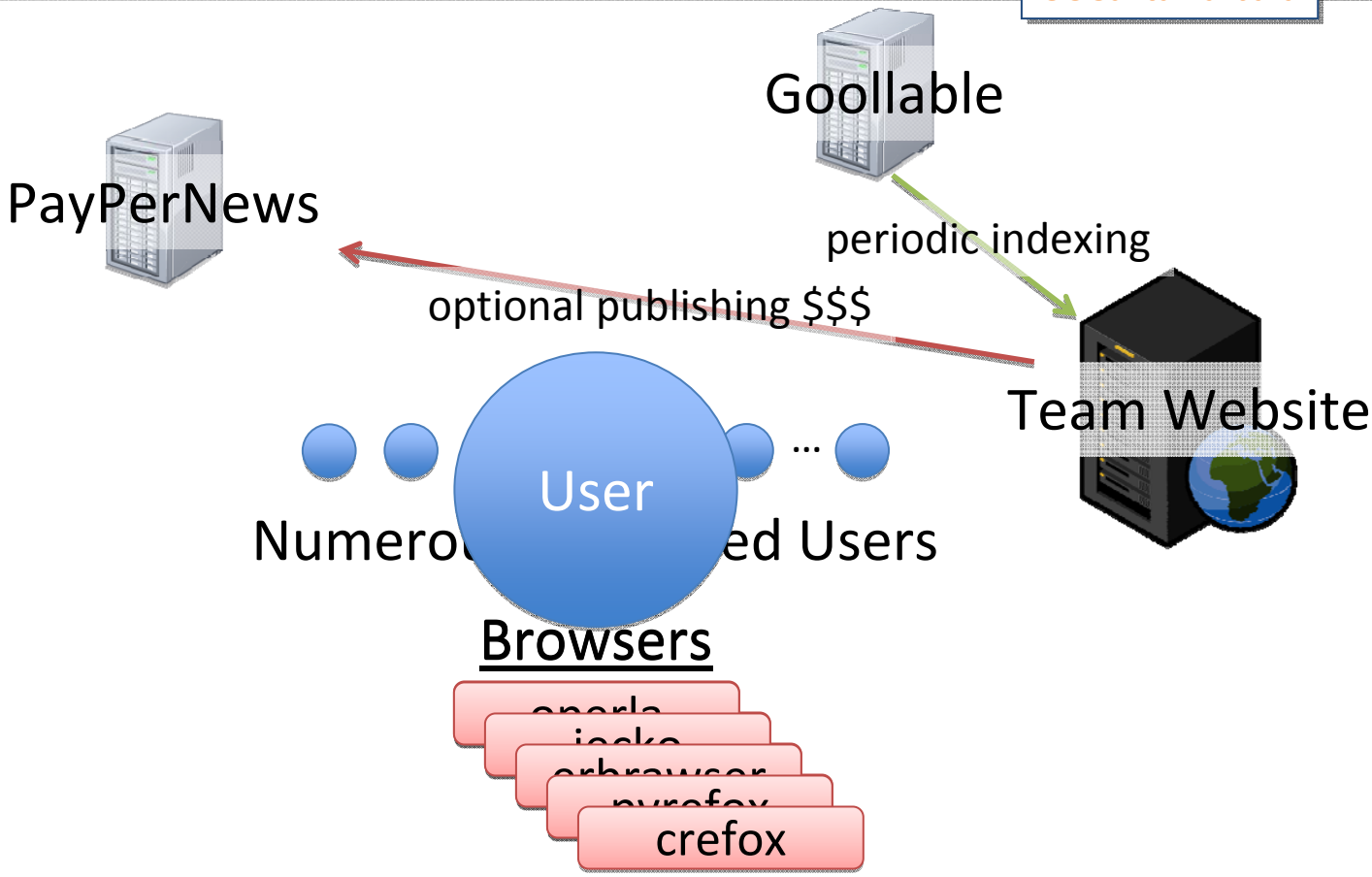
- Also attack based with side challenges
- Mimics a “botnet creation” scenario
- Goal: Deliver *profitable* drive-by-downloads to simulated web users

2009 Game Play

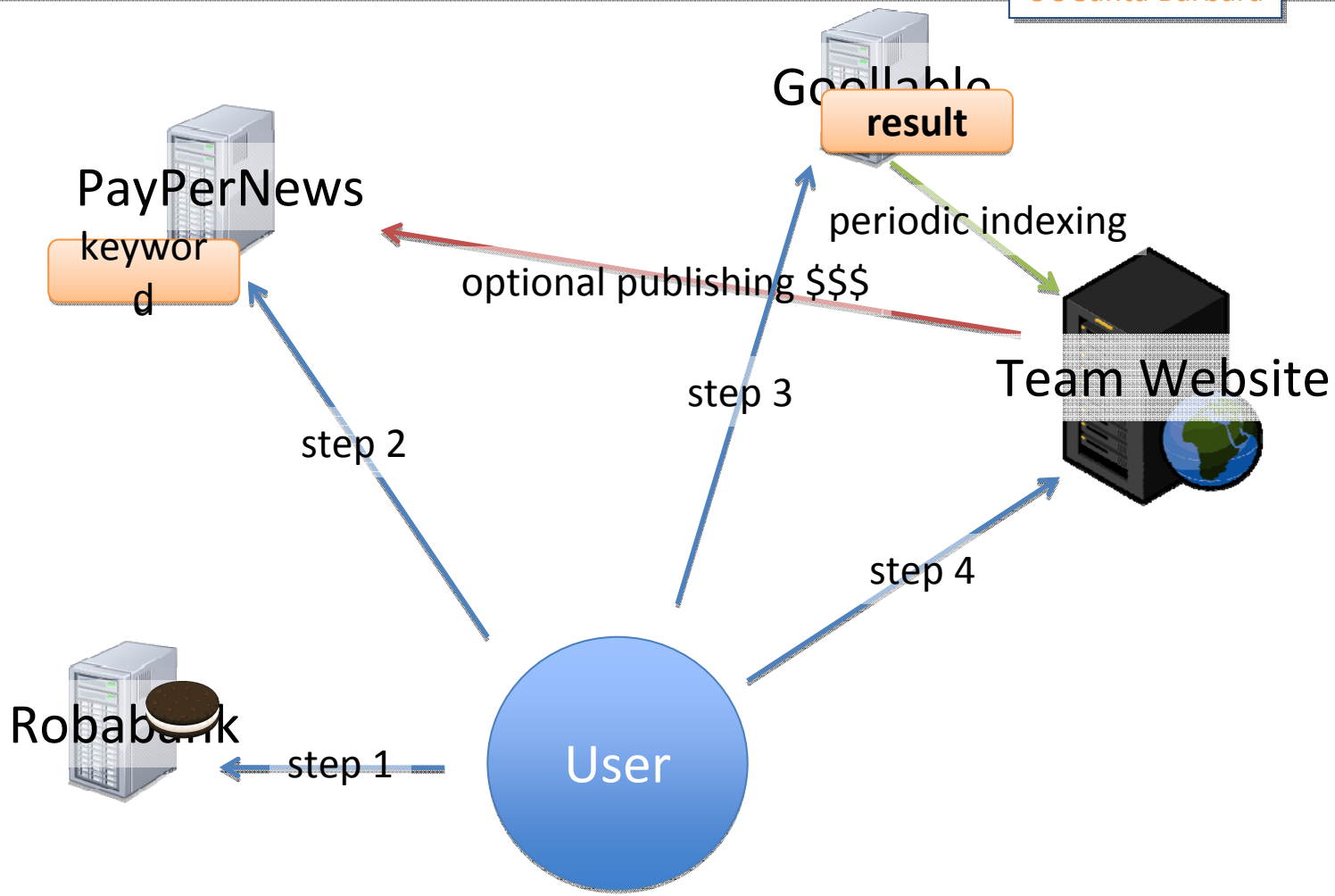
2009 Game Play



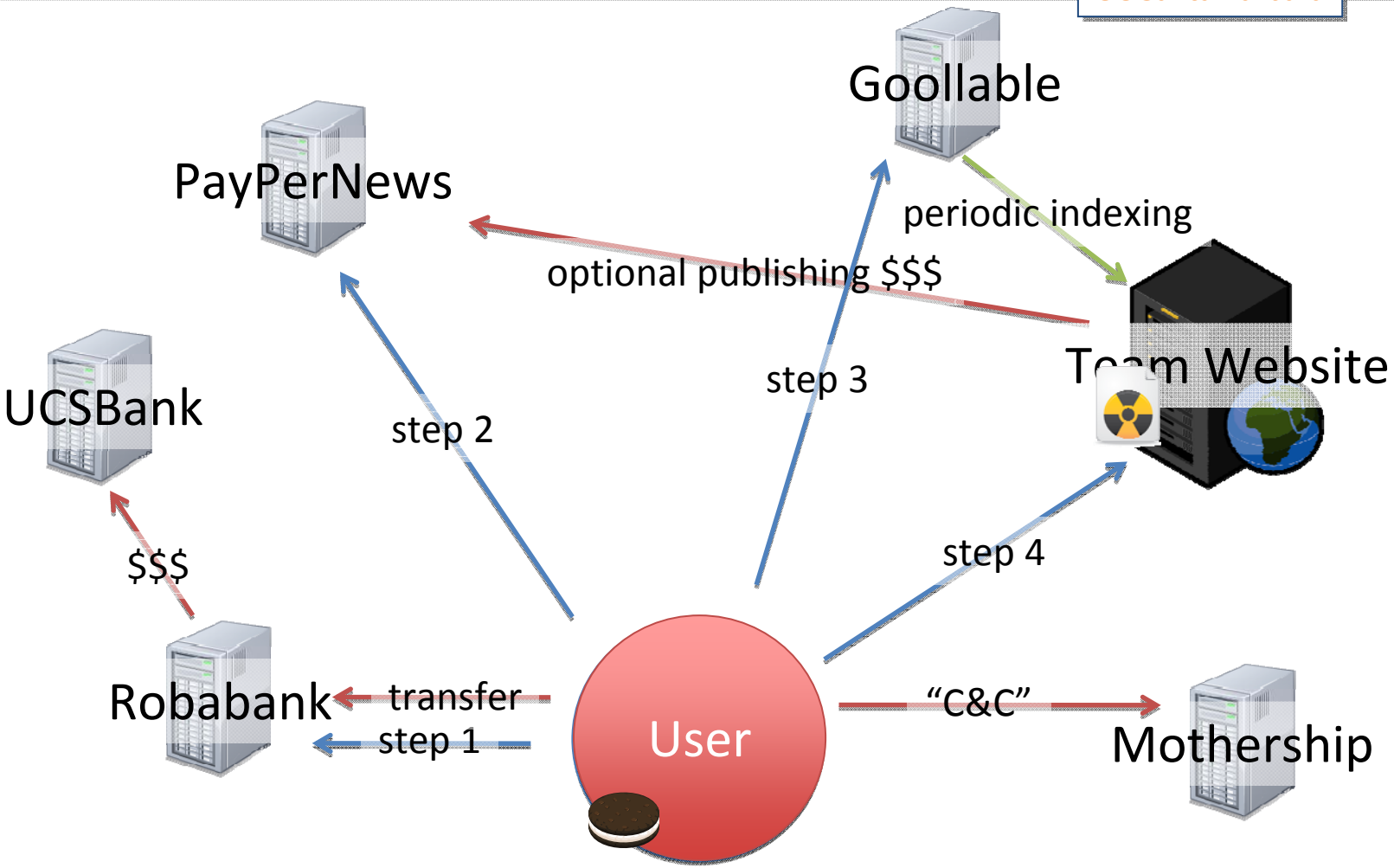
2009 Game Play



2009 Game Play



2009 Game Play



Lessons Learned

- KISS principle
- Budget sufficient time and resources
- Stress test competition components
- Scoring
  - Fully automated
  - Rollback and repeatable
- Attack only competitions level the playing field

Final Remarks

- Hacking Competitions
  - Fun and Challenging
  - Engaging

- Datasets and source from UCSB's iCTF available at http://ictf.cs.ucsb.edu

Questions?