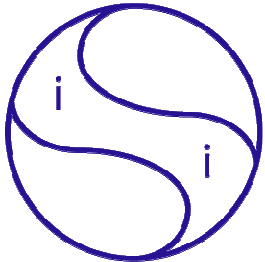Systems and Internet
Infrastructure Security

- Penn State University's Systems and Internet Infrastructure Security (SIIS) Lab

- Trent Jaeger and Patrick McDaniel, co-directors

- Collaborators:
  - Somesh Jha, Thomas Reps, Michael Swift (Wisc)
  - Edmund Clarke (CMU)
  - Vinod Ganapathy, Uli Kremer (Rutgers)
  - Ninghui Li (Purdue) and Michael Hicks (Maryland)

Systems and Internet Infrastructure Security

Client — Channel — Server / Server / Server / Server / Server / Server
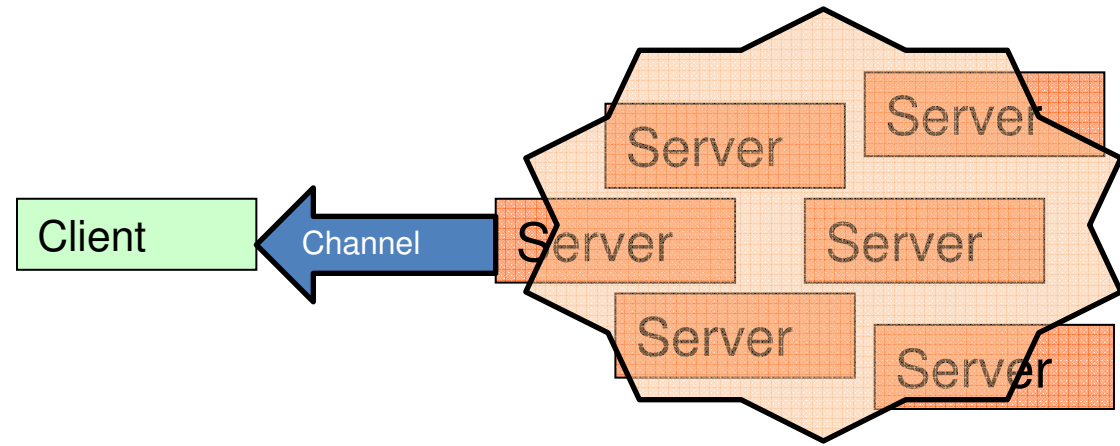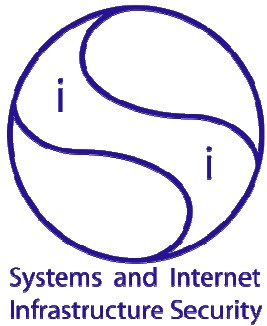
- Goal: *Models, mechanisms, and tools for comprehensive, high integrity in distributed computing*

- Experience with a variety of distributed systems – cellular, web farms, cloud, smart grid

- Experience with a variety of technologies – trusted computing, VM systems, MAC enforcement, policy analysis, source code analysis, distributed system protocols, network security

- # Research in several dimensions
  - Integrity models and analysis
    - CW-Lite/PinUP, analysis of SELinux, XSM/Flask, Android
  - Integrity measurement of relevant ops
    - ROTI (install), IMA (authorized code), PRIMA (info flow)
  - Improve utility for distributed systems
    - VM Verifier, asynchronous attestation
  - Integrity across layers (VMM/VM and app/OS)
    - SIESTA, Labeled channels, PIDSI, FlowwolF
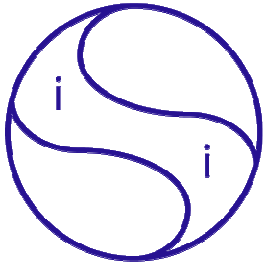
- Challenges
  - Gaining comprehensive integrity guarantees
    - In OS, VMM, and trusted applications
  - Source code and policy analysis
    - Find problems, augment source code, determine security requirements
  - Extending to distributed systems
    - Distributed system protocols, distributed systems, distributed system data, other types of components (e.g., storage)
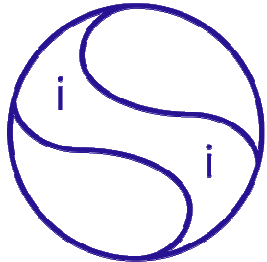
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