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October 2005

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Research Interests

- Distributed Systems
- Networking
- Operating Systems
- User Interfaces

Exploiting Network Flow Relationships

with Hao Shang

Understand the relationships among traffic flows generated by networked applications such as the Web, streaming media, games, peer-to-peer and grid computing. Study traces of traffic logs.

Explore techniques to take advantage of *space-available* packets within these flows to improve application performance.

Specific work:

- Piggybacking related names to improve DNS performance.
- Making better use of all those TCP ACK packets.
- Evaluate potential of packet aggregation and “critical” packet protection.

Internet Content Characterization and Delivery

with Balachander Krishnamurthy, AT&T Research

Analyze factors that influence end-to-end web performance.

Client characterization and server adaptation.

Current work on examining the presence and performance/privacy impact of potentially “undesirable content” such as ads on the Web.

Also study use and implications of tools to anonymize access to Web content.

Content Networking and Utility Computing

with Balachander Krishnamurthy, AT&T Research, Yin Zhang, Univ. Texas-Austin, Misha Rabinovich, Case-Western Reserve

Early work on studying the use and performance of content distribution networks.

Extend to not just content, but computation in a networked environment.

Ideal of utility computing platforms is that they seamlessly handle application needs for additional resources in the same way a utility grid handles requests for additional power.

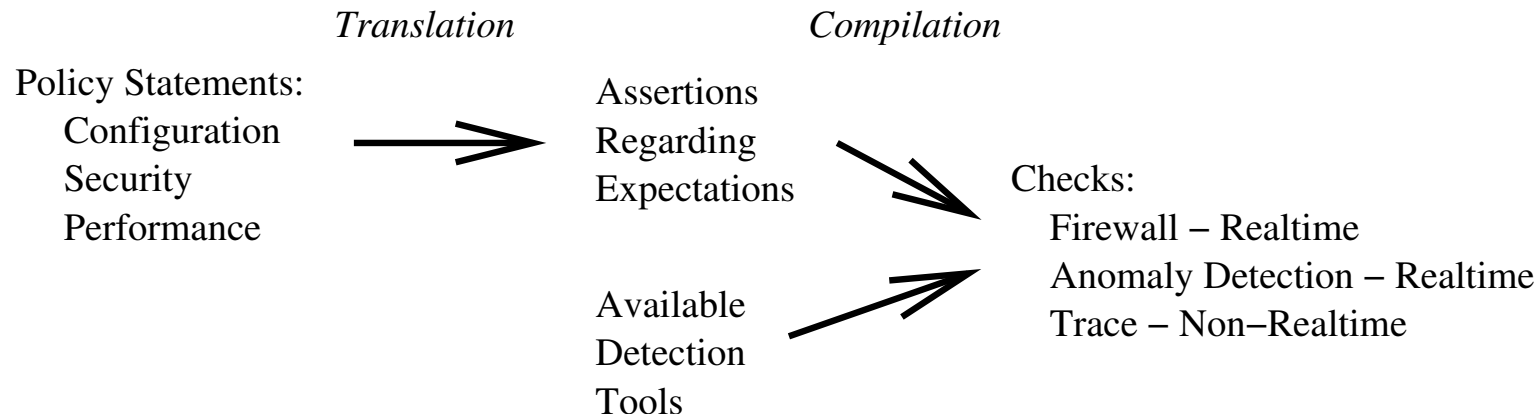
Investigate approaches to provide a reliable and dynamic platform for a variety of application needs.

Combine cluster and virtualization techniques.

Application Management

Work begun while on sabbatical at Cisco Systems.

Use dependencies to assert expected application and network behavior.



Sample assertions:

```
# traffic to non-port 80 must never exist for Web server
```

```
*.*.*.* -> www.example.org !80 N
```

```
# traffic to internal database server is always expected to exist
```

```
www.example.org -> db.example.org ms-sql A
```

```
# expect that the connrate for all clients is within 20% of baseline
```

```
*.*.*.* -> www.example.org 80 A connrate < <0.8,1.2>baseline
```

IMPACT

with Paul Timmins

Design and build a context-aware computing system, the Integrated Management of a Personal Augmented Calendar Tool (IMPACT).

Build on a user's plan to prioritize, organize and deliver any and all information that will impact the activities of that user.

Query existing information sources such as traffic and weather along with user sources such as email.

Determine the level and urgency of impact so that it can be delivered to the user at times and via means designed to minimize disruption.