SALSA: Structured Approach to Large-Scale Anonymity

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**Motivation**

Investigating the security of peer-to-peer networks by the implementation of Salsa

**Objective**

The objective of this project is to improve anonymity in peer-to-peer systems by using Salsa and trying to find the most ideal setting. This is a Research Experience for Undergraduates (REU) program funded by the National Science Foundation (NSF).

**Method**

Salsa simulations were executed for different parameters:
- Nodes = 4000
- Address Space = 30
- Tree Height = 6
- Redundancy = 4

**Results**

- 90% successful lookups at 9% malicious nodes
- Difference in successful lookups after 9.5% malicious nodes
- Approximately 98% successful lookups when containing 0% malicious nodes
- 20% malicious nodes there is a 3.3% difference in successful lookups

**Conclusions**

- Increasing the redundancy increased the percentage of successful lookups
- No significance in levels of redundancy until after 9.5% malicious nodes
- For between 8-20% malicious nodes, it is highly beneficial to use increased redundancy (r=20).

**The Salsa System:**

- Highly-distributed anonymous communication systems can help prevent some types of attacks.
- Salsa enables such systems by securely organizing large numbers of volunteer nodes.
- Each node has an ID number, and nodes are put into groups based on their ID.
- Salsa organizes the groups into a virtual tree so that other nodes can be found.

**Experimental Results**

- Percentage of Malicious Nodes vs. Percentage of Successful Lookups

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**Student Introduction:** Rafael Nicks is a student at the University of Southern Mississippi majoring in Electronic Engineering Technology. Rafael is entering his 4th year as an undergraduate. This is Rafael's first year being involved in an undergraduate research experience program.