Privacy Preserving Intrusion Detection

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Motivation

• Privacy and surveillance by intrusion detection are potentially conflicting organizational and legal requirements
• Companies do not want to reveal if attacks occurred, and whether they succeeded
• Companies producing IDS may not want to reveal their entire set of attack patterns, as that is a valuable business asset
Signature Matching Intrusion Detection

- Majority of commercial products based on matching attack signatures
- Real Time: Raw packet capture followed by signature matching
- Offline: Logs and audit trail database maintained, followed by offline signature matching

Offline Intrusion Detection

- Real Time IDS cannot handle very high load before going “blind”
- Need to store audit databases anyway, to detect penetrations matching “new attacks” found
Pattern Matching

- Regexp (Regular Expression) is a common pattern matching language in the UNIX environment
- Regular Expressions are powerful enough to encode not just attack patterns, but also attacker profiles (since these can be represented by a string of “pertinent” attack patterns)

Problem

- How to detect patterns in the log files without revealing either the actual patterns or the log file information
- In effect, we need to create a finite automaton which works without the actual “true” input
Secure Database Access Problem

- How to find if a string \( q \) exists in a database of strings.

- The exact matching problem has been extensively considered in the literature

- Provides a yes/no answer

Regexp matching

- For regexp matching, we need to make three modifications in the solutions for SDA.
  - To allow matching of ranges
  - Specifying position from which to start matching
  - Reply should give position at which matched
Issues to consider

• Possible integration of secure matching with transaction based pseudonyms in audit data

• Scalability issues when matching patterns against large log files

• Viability of the approach in terms of speed/communication costs