Database Support for Audit Trails & Intrusion Detection

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Students

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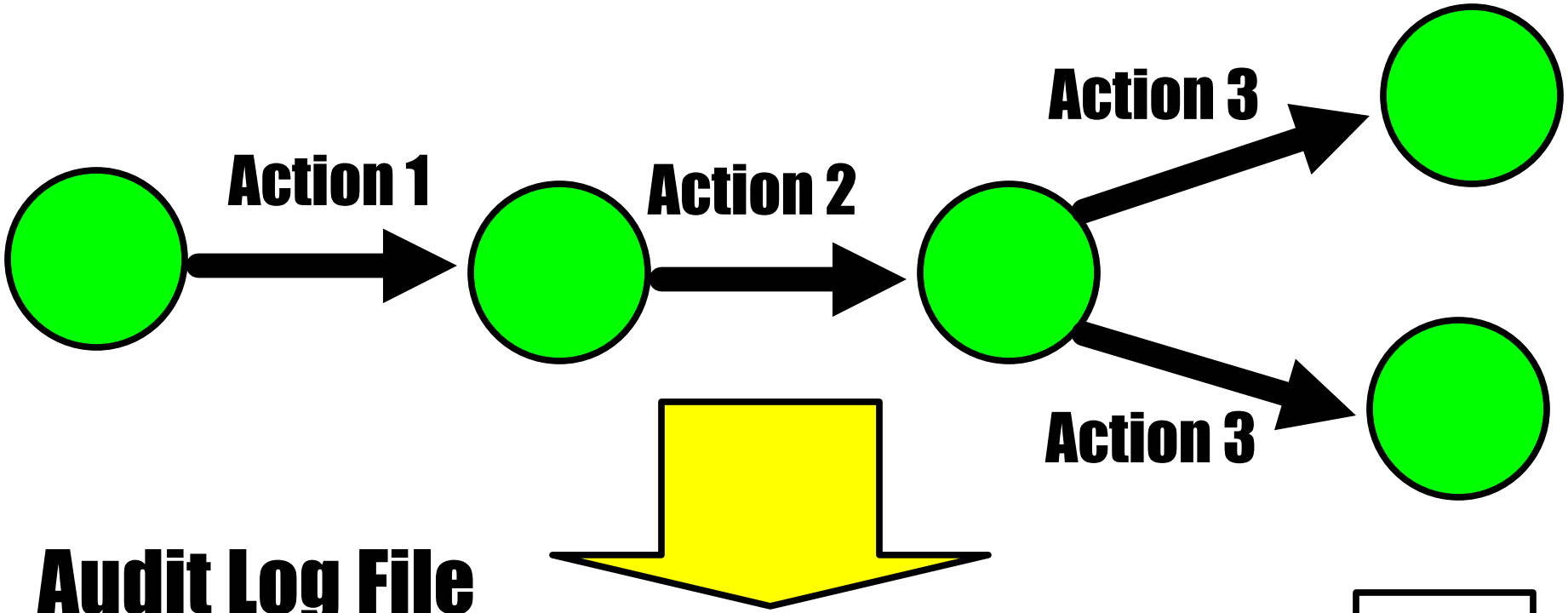
Why use DB support ?

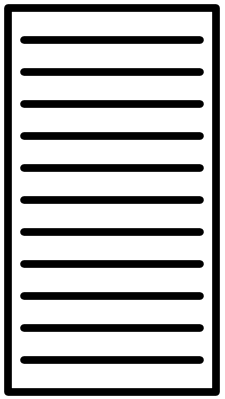
- Flexibility and extensibility
- Efficiency
- Scalability
- Maintainability
- Ease of use and convenience

Attack and Audit Log Files

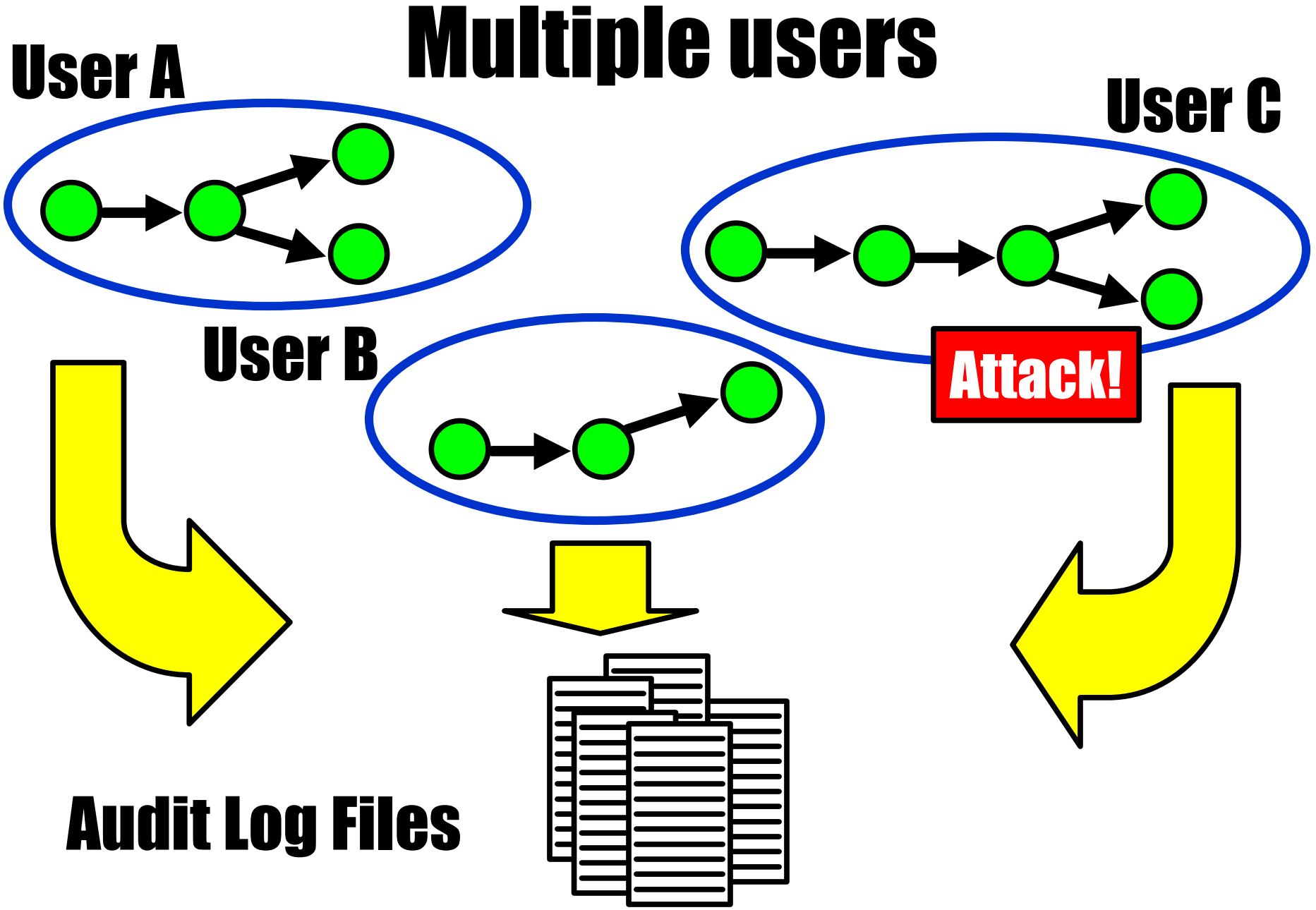


Audit Log File

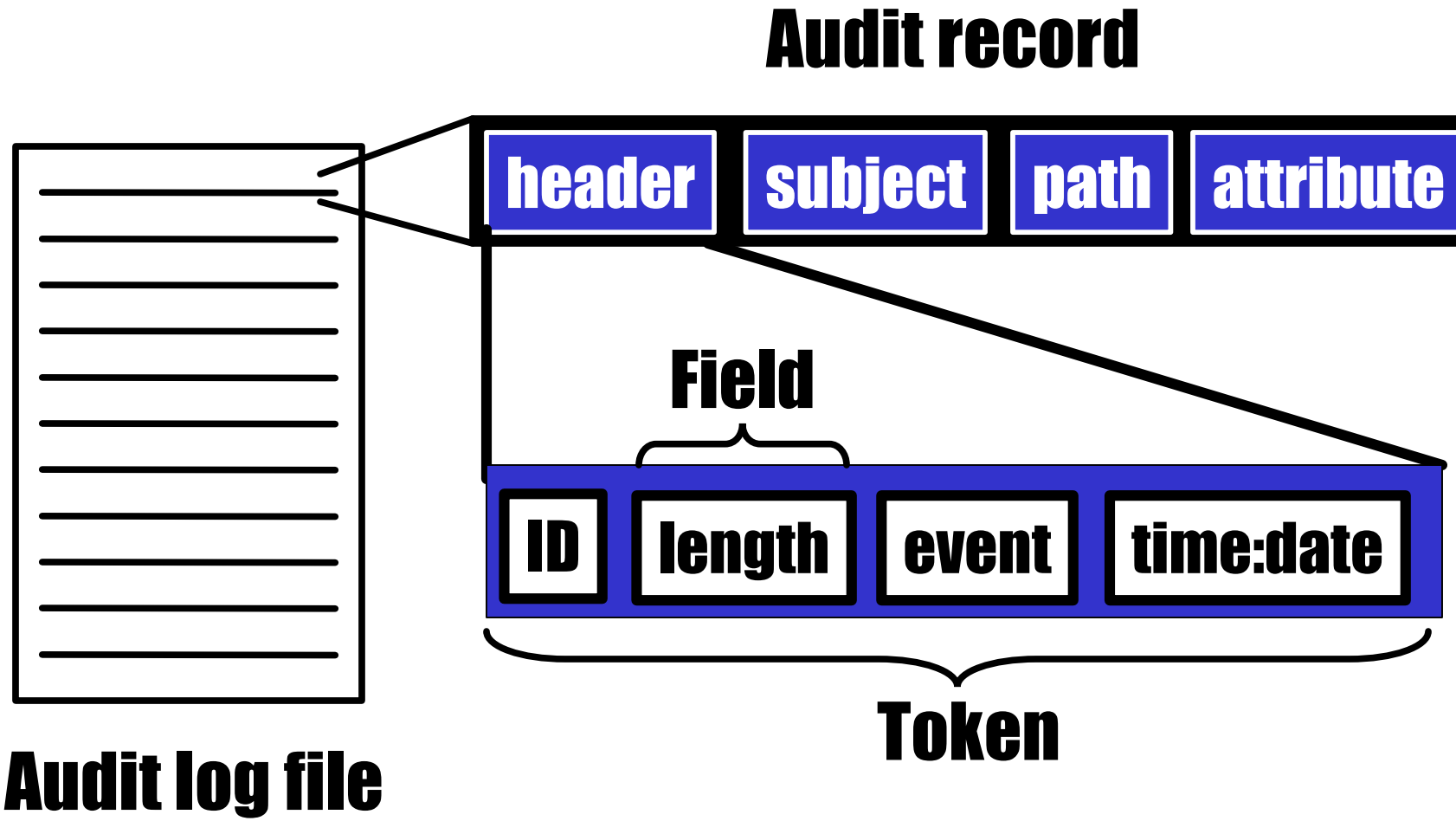
Action1:user:date:time:IP address:attributes
Action2:user:date:time:IP address:attributes
Action3:user:date:time:IP address:attributes
…



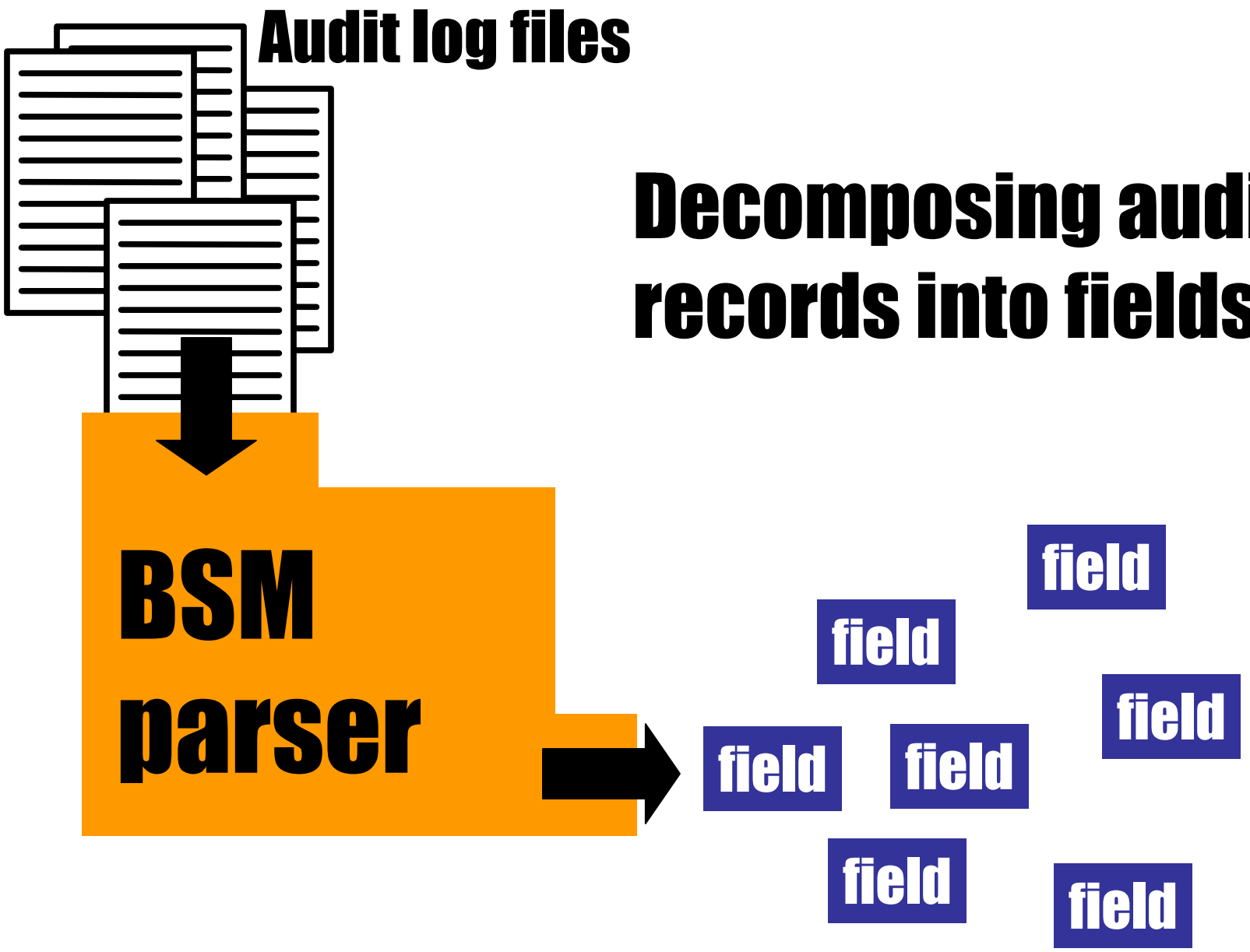
Multiple users

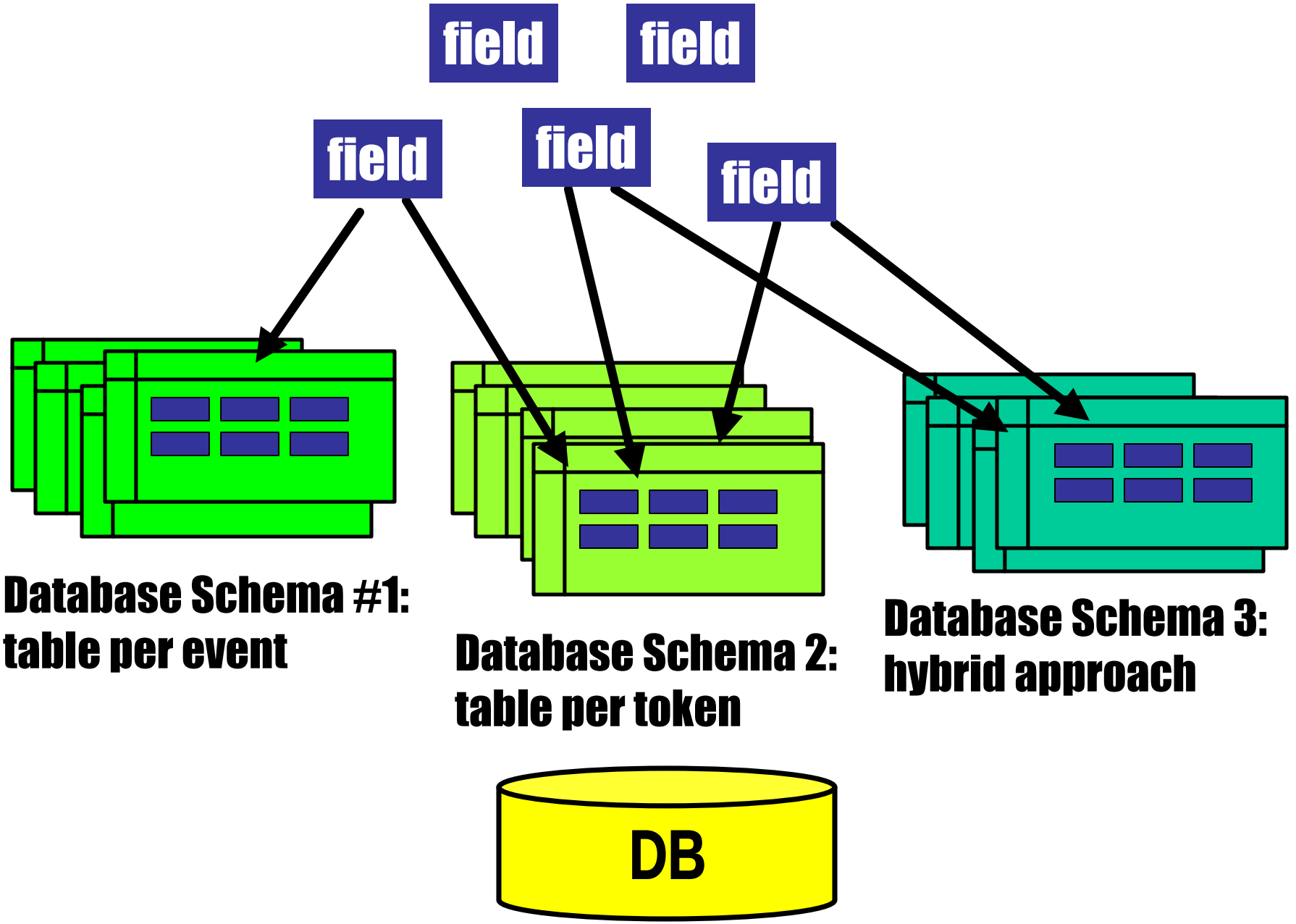


BSM audit format



Decomposing audit records into fields




field
field
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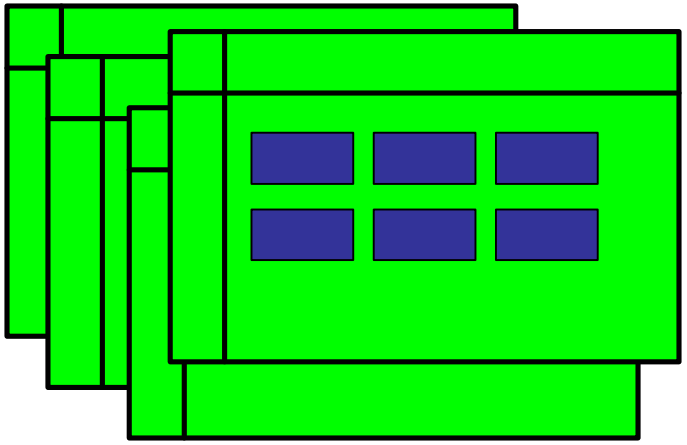
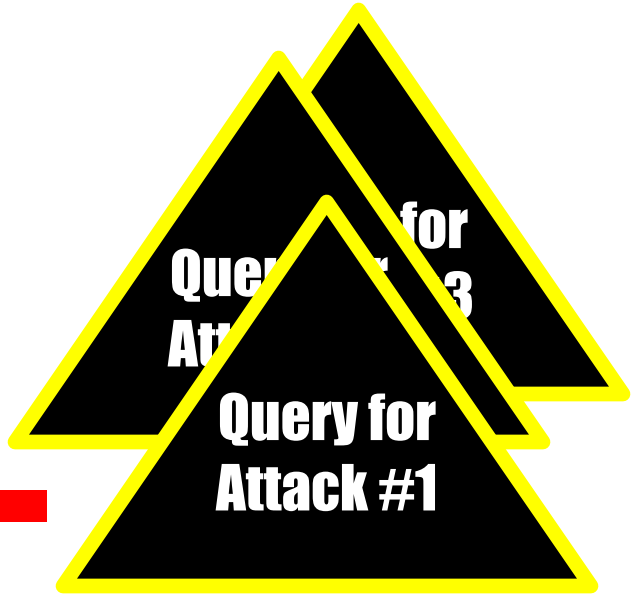
field
Database Schema #1:
table per event
Database Schema 2:
table per token
Database Schema 3:
hybrid approach
DB

Database tables containing audit data



SQL detection queries



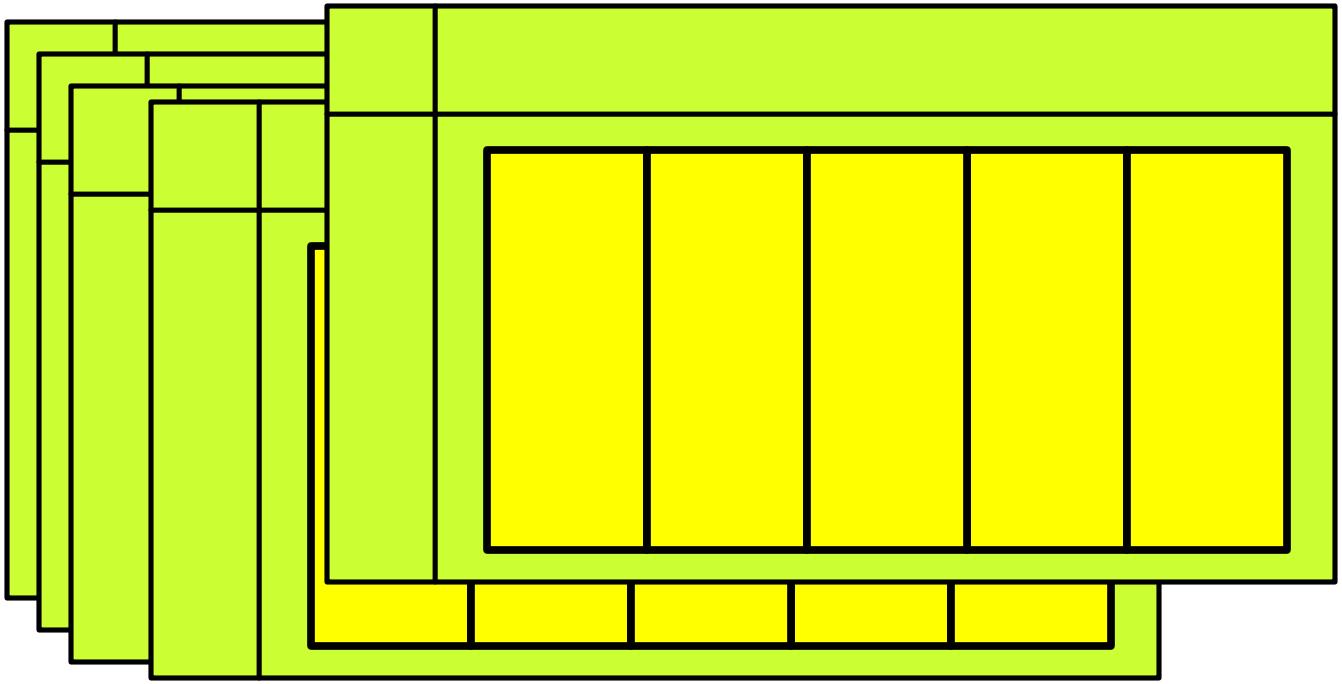
Detection report :

Pattern of Attack #1 detected: User C, Date, Time
Pattern of Attack #2 detected: User C, Date, Time

Database Schema 1. Table per event

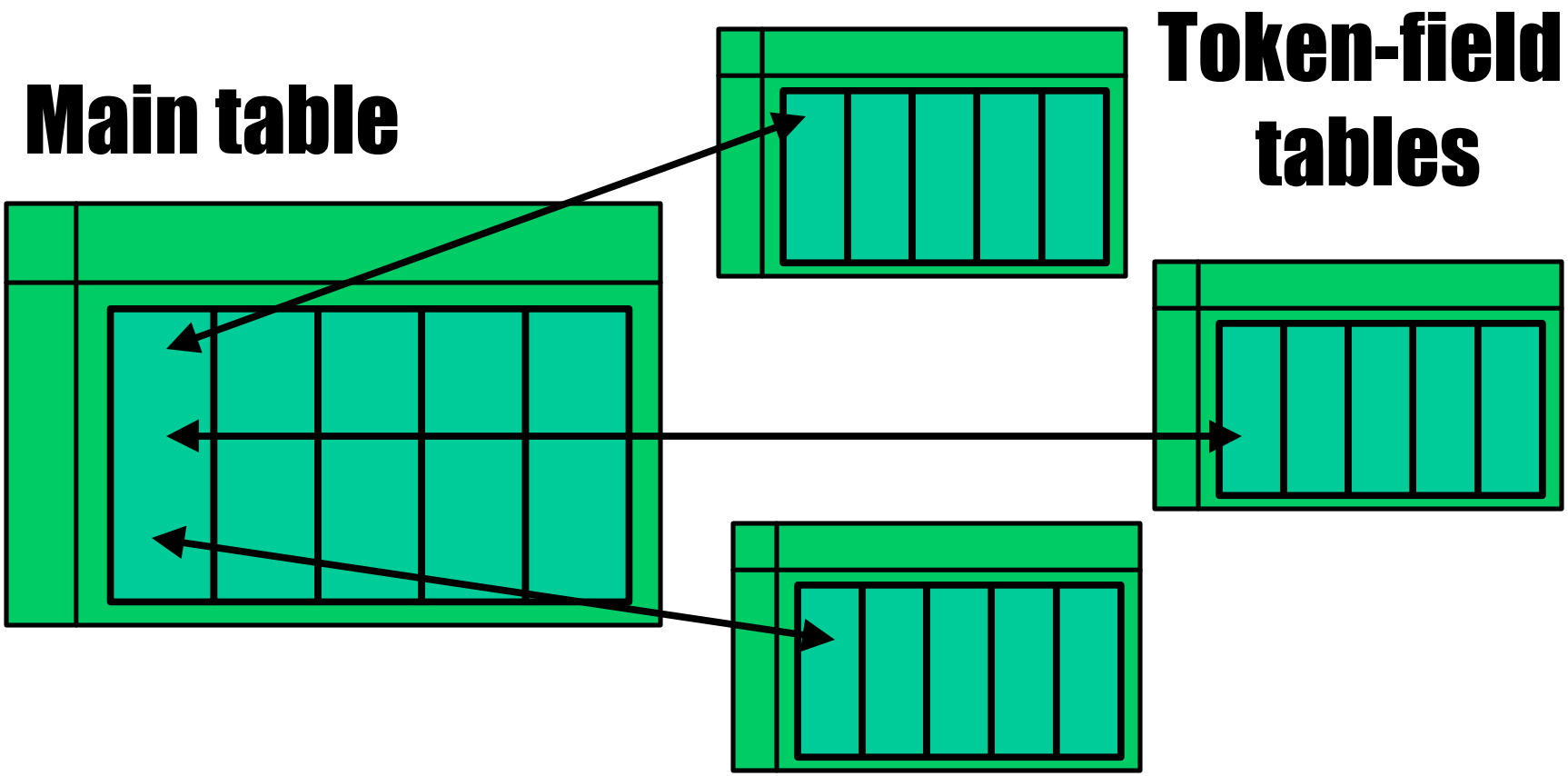
- Natural implementation from the BSM format

Event tables



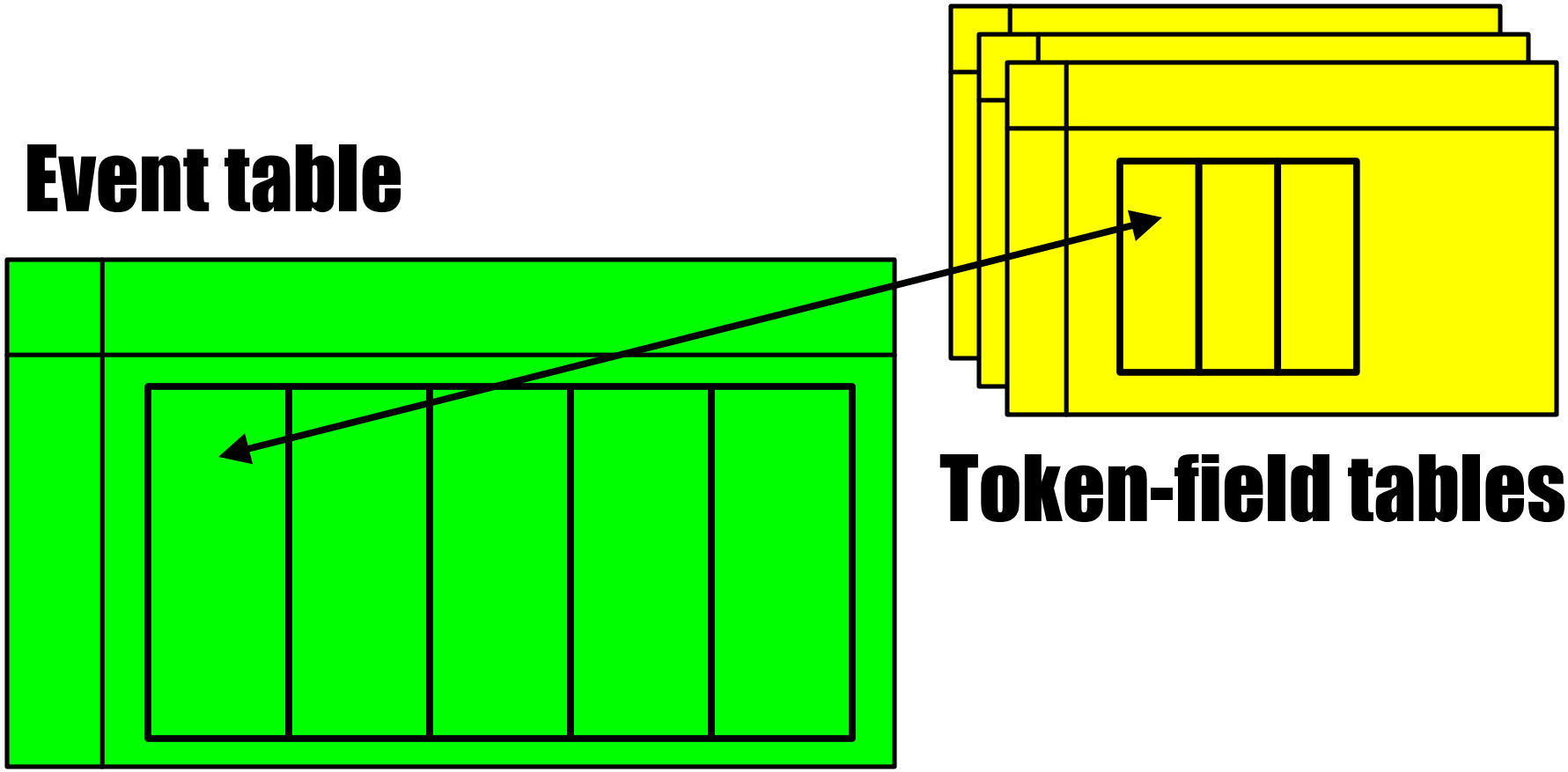
Database Schema 2. Table per token

- Ease to include new events



Database Schema 3. Hybrid approach

- Remove redundancy and improve efficiency



Status

- 3 alternative schemas developed
- Scanning, parsing, uploading and detection integrated in one program
- Writing more elaborate SQL queries

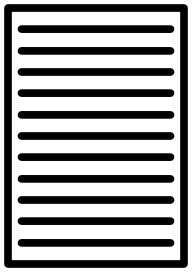
Points to address

- More extensive scalability testing
- More complex attack patterns

Tools used

1. Oracle 8. Relational Database Management System

2. BSM. Basic Security Module, Sun Microsystems



3. ANTLR 2.0.7. Language generator

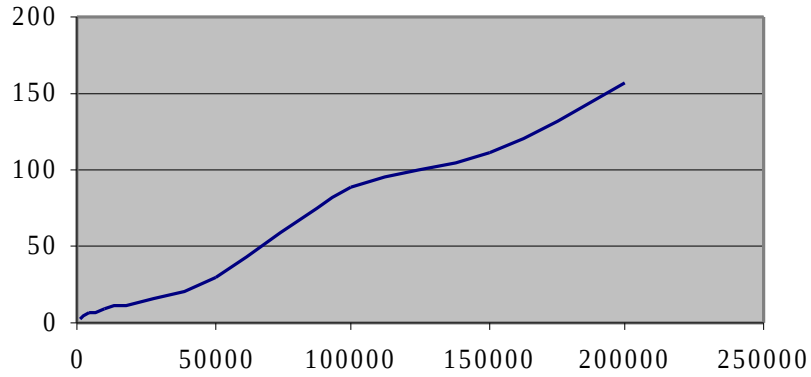
   - BSM grammar (Chapman Flack, CERIAS)

4. Java 1.2.2

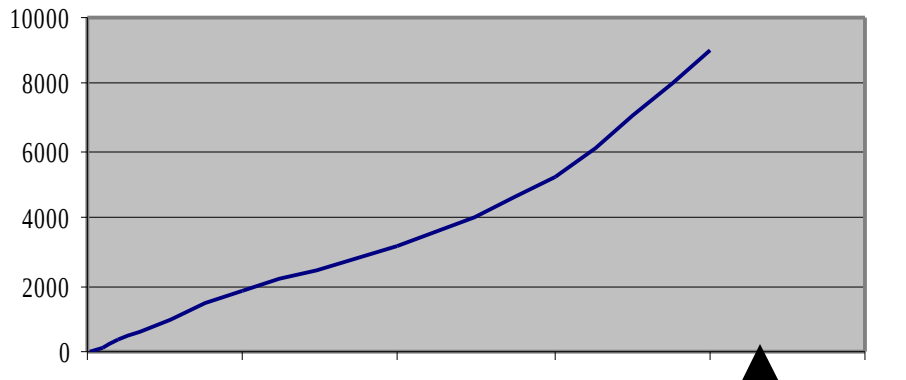
5. SunOS 5.6. UNIX scripting (csh)

Performance graphs

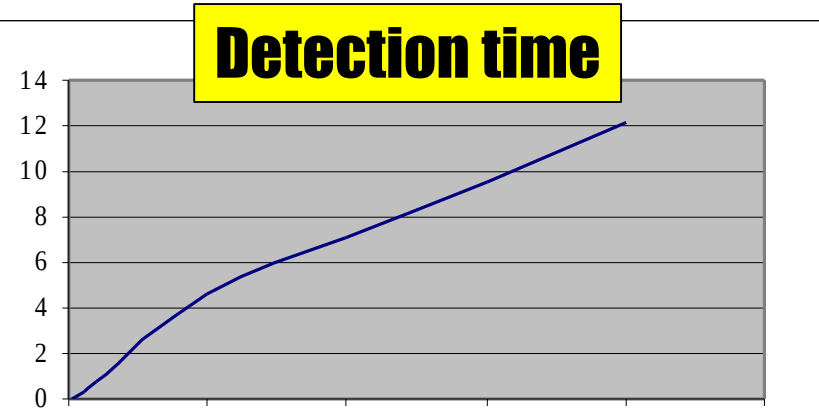
Generation time



Sequential upload



Detection time



Batch upload !