Baze podataka II
Modul 13 – Jezik SQL

Napredne teme

Enkripcija, forenzika i DaaS

Summary

- Enkripcija podataka
- Prikupljanje digitalnih dokaza
- DaaS

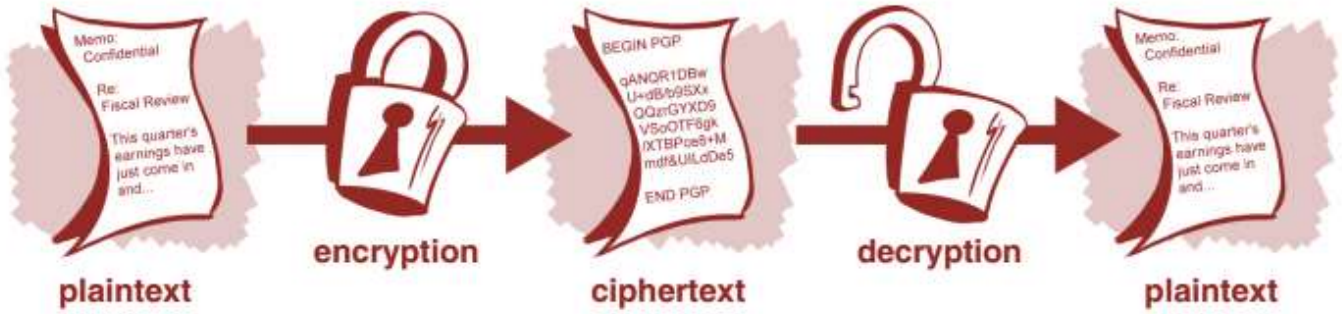
Lekcija 1: Enkripcija podataka

- How to speak crypto?
- Quick example
- SQL Server encryption hierarchy
- Symmetric key column encryption
- Additionaly cryptographic features

How to Speak Crypto?

- **encryption** is the process of transforming information (referred to as plaintext) using an algorithm (called a ciphertext) to make it unreadable to anyone except those possessing special knowledge, usually referred to as a key. The result of the process is encrypted information (in cryptography, referred to as ciphertext).

- Wikipedia



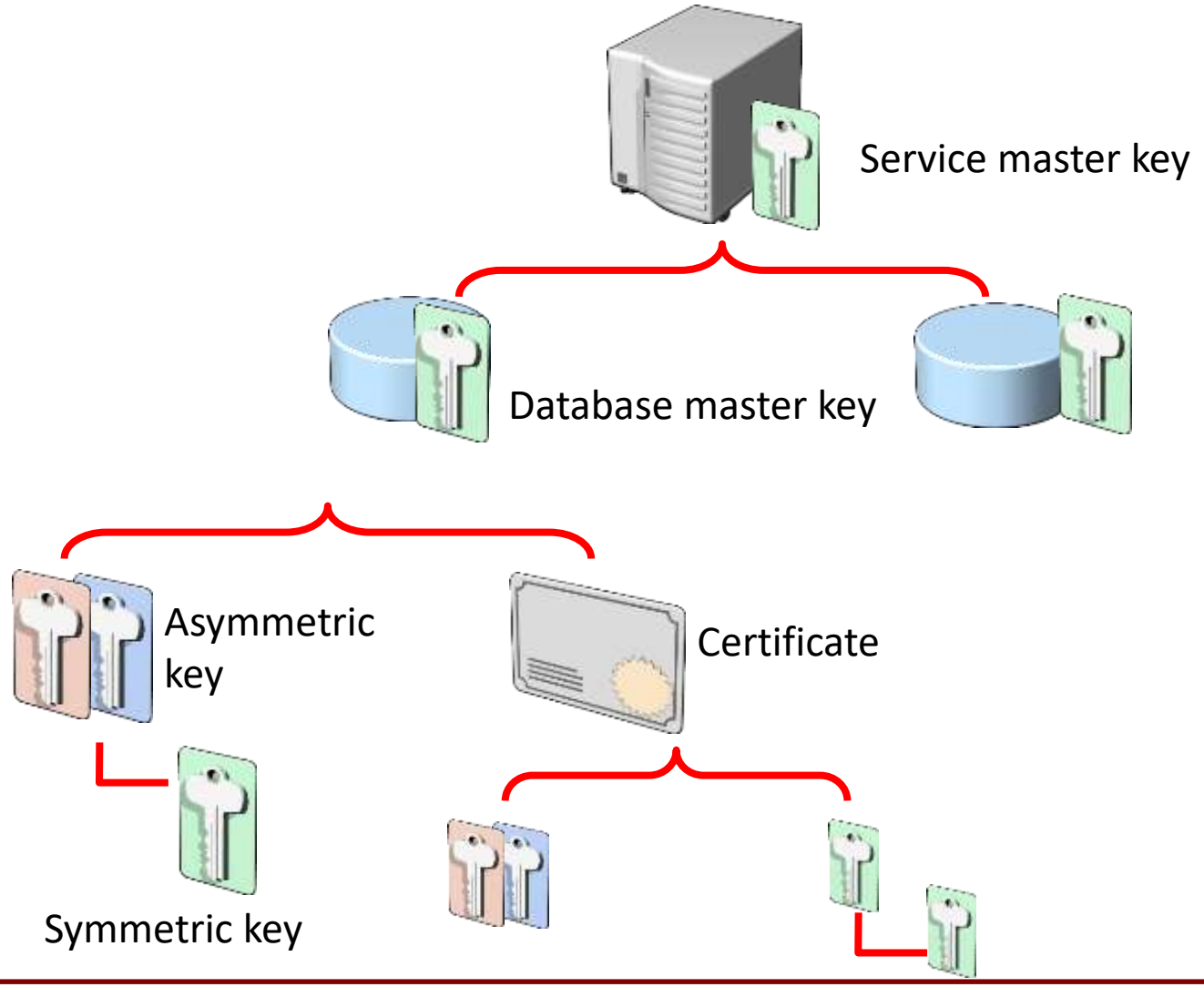
Quick example

Plaintext: Baze podataka

Ciphertext:

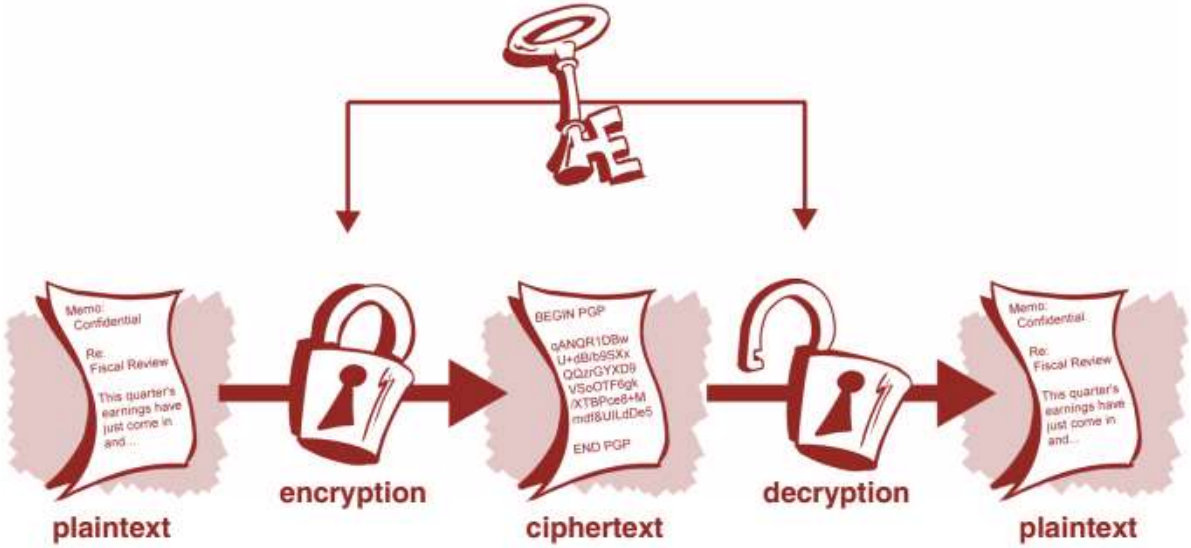
0x00E54815CF1CD2765D1B2392604E2E99010
00000B557EBD1C9C2E89B93D530D54880E40
B6131CECFACF55B887DD35AC5ECE2D739E43
7B2D8120225A18CEA96B34B3793A9

SQL Server encryption hierarchy



Symmetric key column encryption

- Symmetric Keys are created in a database and they are always in that database
- What can you encrypt/decrypt?
  - Data in tables (column level)
- Encryption require an additional CPU load from their use.



Additionaly cryptographic features

- Asymetric encryption
- Transparent Data Encryption – TDE
- Backup encryption
- Always encrypted

Lekcija 2 : Digital evidence collecting

- Computer crime
- Digital forensics
- Phases of digital forencis
- Access control
- DDL trigger
- DML triggers
- Anti-tampering

Computer crime

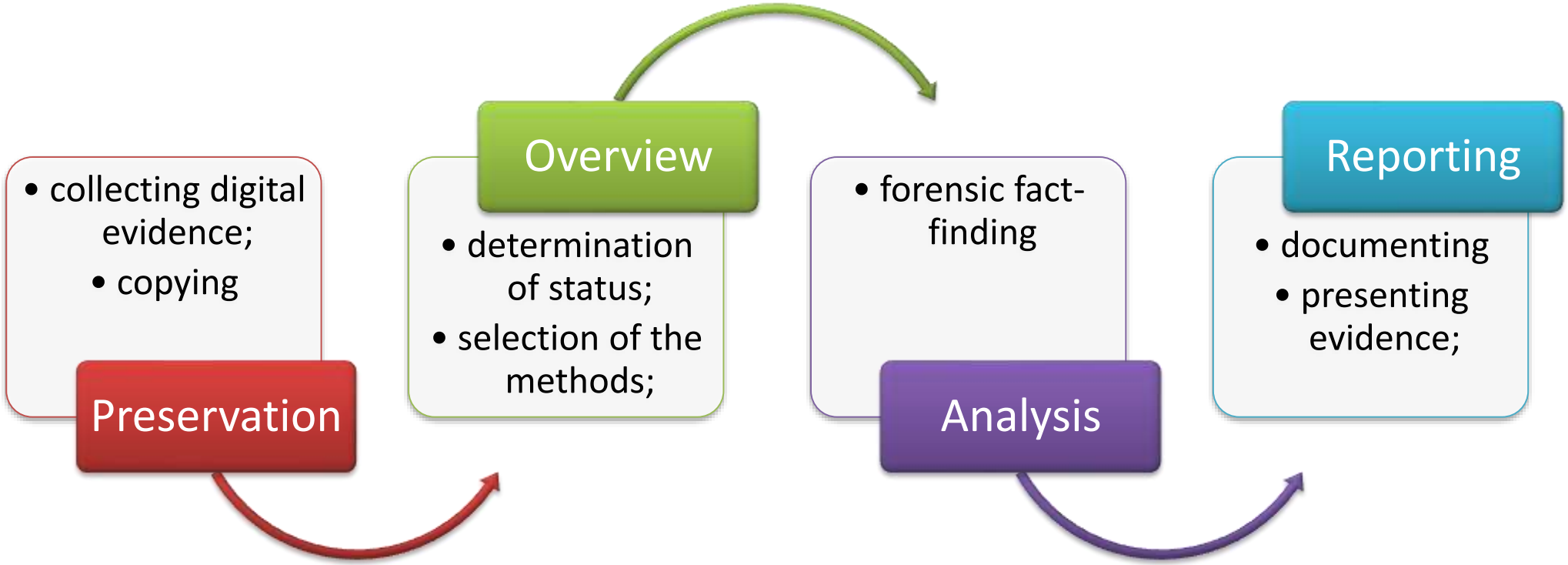
- **Computer crime is activity where computer is: resource, service, tool, target or place of criminal act.**
- **Goals?**
  - Electronic fraud
  - Identity hijacking
  - Interferences of within the data
  - Unauthorized access;
  - Network interceptions;
  - ...

Digital forensics

- ...is a part of the investigation, which involves the scientific analysis: the media / storage devices and / or devices for data processing;
- Servers, PC, laptop, tablet, mobile devices, storage media...

- ... with the aim of finding traces of the activities that led to the crime.

Phases of digital forencis



Access control

DDL triggers

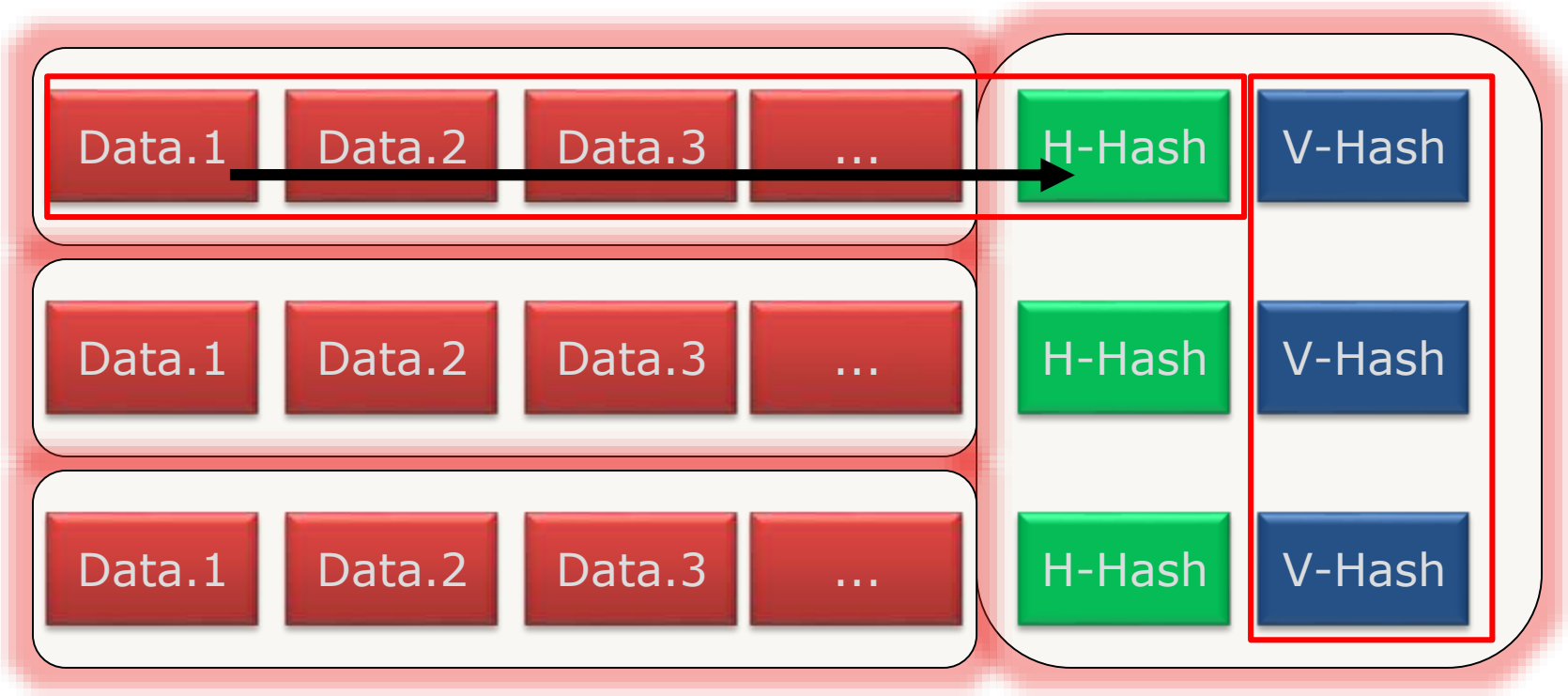
- **Server and database levele events**
- **Accompanied by changes in the scheme of objects**
  - CREATE, ALTER, DROP;
- ***Eventdata* function collects data for the DDL event;**
  - The output is a collection of data in XML format

DML triggers

- **DML operations are much more frequent in the DB;**
  - INSERT
  - UPDATE
  - DELETE
- **To gather information on the event types are used AFTER triggers;**
  - Unlike the DDL, DML triggers were connected to the table;
- **Performance issues;**
  - No need to put trigger on all tables;
  - The problem can be solved by generic CLR triggers

Anti-tampering

- One of the methods



Lekcija 3 : DaaS

- Azure introduction
- SQL Azure...what it is?
- Three different ways
- Some facts

> 25 TRILLION storage objects

> 2.5 MILLION requests per second

Greater than 1,000,000 SQL Databases in Azure

> 300 MILLION AD users

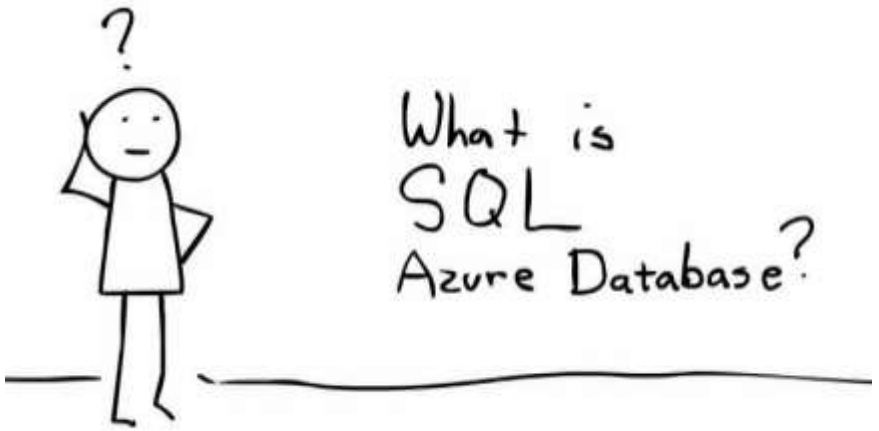
> 13 BILLION authentications per week

16 regions worldwide

16 regions worldwide

SQL Azure...what it is?

- The SQL database as a service offering on Azure (OLTP).
- Fully managed by MS as part of Azure.
- It's not a full instance. Many features that you're used to don't exist because it's fully managed.
- At this point different then SQL Server 2014 on premise



Three different ways

SQL Server

- Raw iron

SQL Server in IaaS

- Virtualized Machine

SQL Database – PaaS - DaaS

- Virtualized Database

Some facts

- **Good solutions for start-up‘s**
  - Small and medium size of business
- **Initial cost far beyond of „raw iron“**
- **Security, HA, is great**
- **Location of data and privacy can be issue**
  - Private cloud can fix this

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