

Internet of Things(IoT) in health environment

© P&S;

Ver. 04.10;07:11



Sara Pomper

Student FOI Varaždin, III year

Vladimir Bahun mag. rad. techn.

Radiology, G.H. of Varaždin

Dražen Pomper, B.Sc. O-IT

Head of computer science center

General hospital of Varaždin

...
New information
everywhere
IV industrial revolution
("big deep data")
Data from sensors

Weekly edition of NY
Times give more
information than she has
received in whole life in
time of 18-century(1701-
1800)





On which way is running a new world emerges

Standard today in the world:

Cyber exter space, Internet, use service on unknown location over IP provider

IaaS(Infrastructure)

PaaS(Platform)

SaaS(Software)

LBaaS(Load of system)

Payment of service by using the resurce



• Cloud

Platform i technological standard (EU directive)

- Access to data from anywhere
- Data centar is platform

• Mobile

- Cell phone is distribution media for projection of information

Google servis 17 GB (on line service)

Disk 176 MB,

Mail 9 GB : 34511 input mail,

Pictures 261 MB

Search, Map,, Disk,

Calender,, Translator, Pictures,

Documents,...



No charge, access from everywhere, local copy of data, no privacy

Already in our personal private life and bussiness to

...
G O O g l e TM

• Security

- PKI -public key infrastructure
(digital certificate)
- Smart card is history, new hero is cell phone
- 128 bit kriptography and tuneling, digital signature
- Backup, Restore, Virtualization



Elements: (IoT)

Unit that generate data

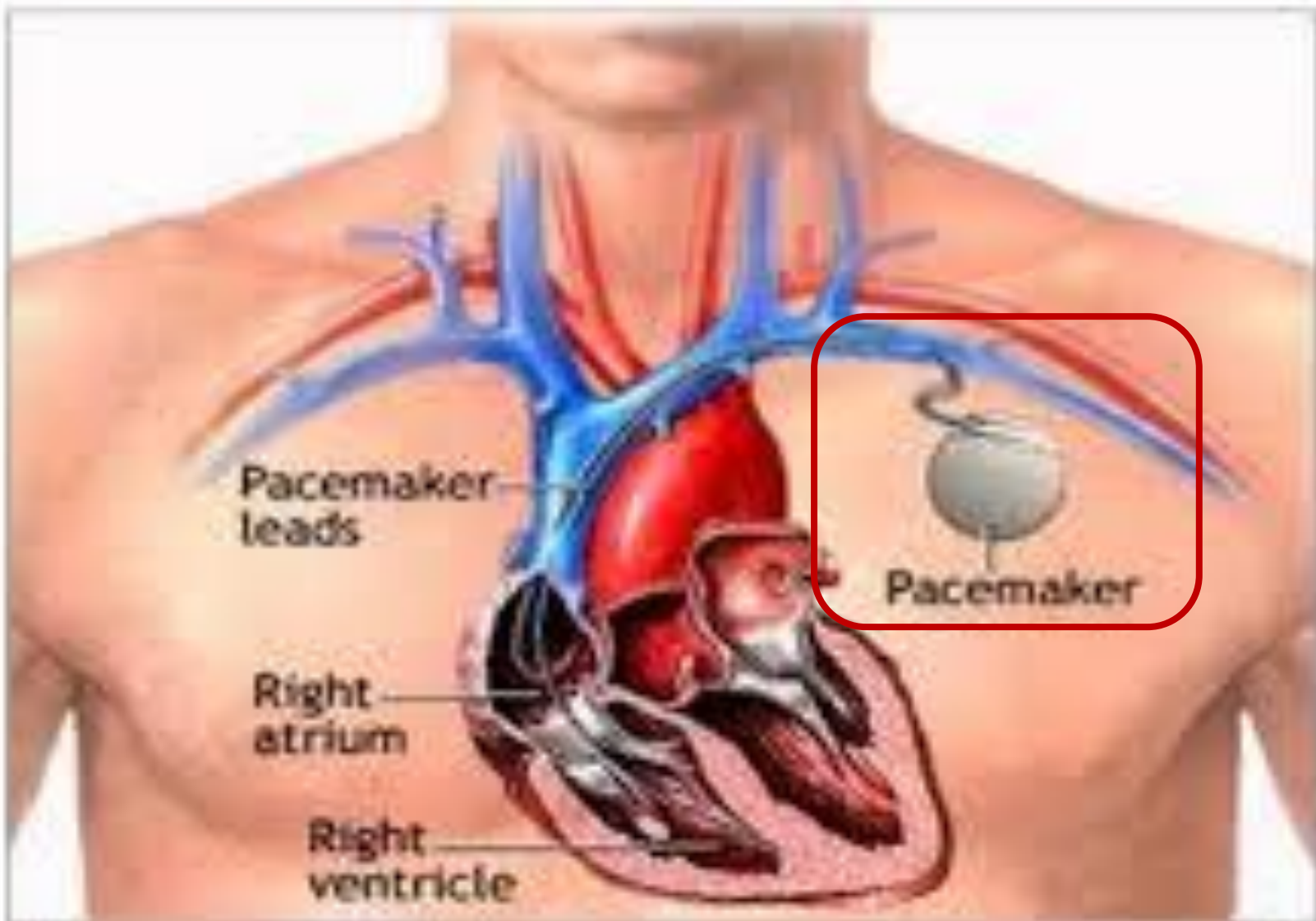
Unique identifiers

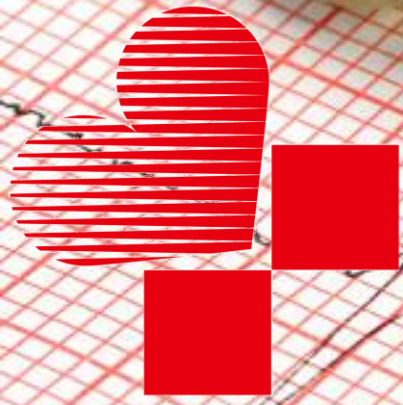
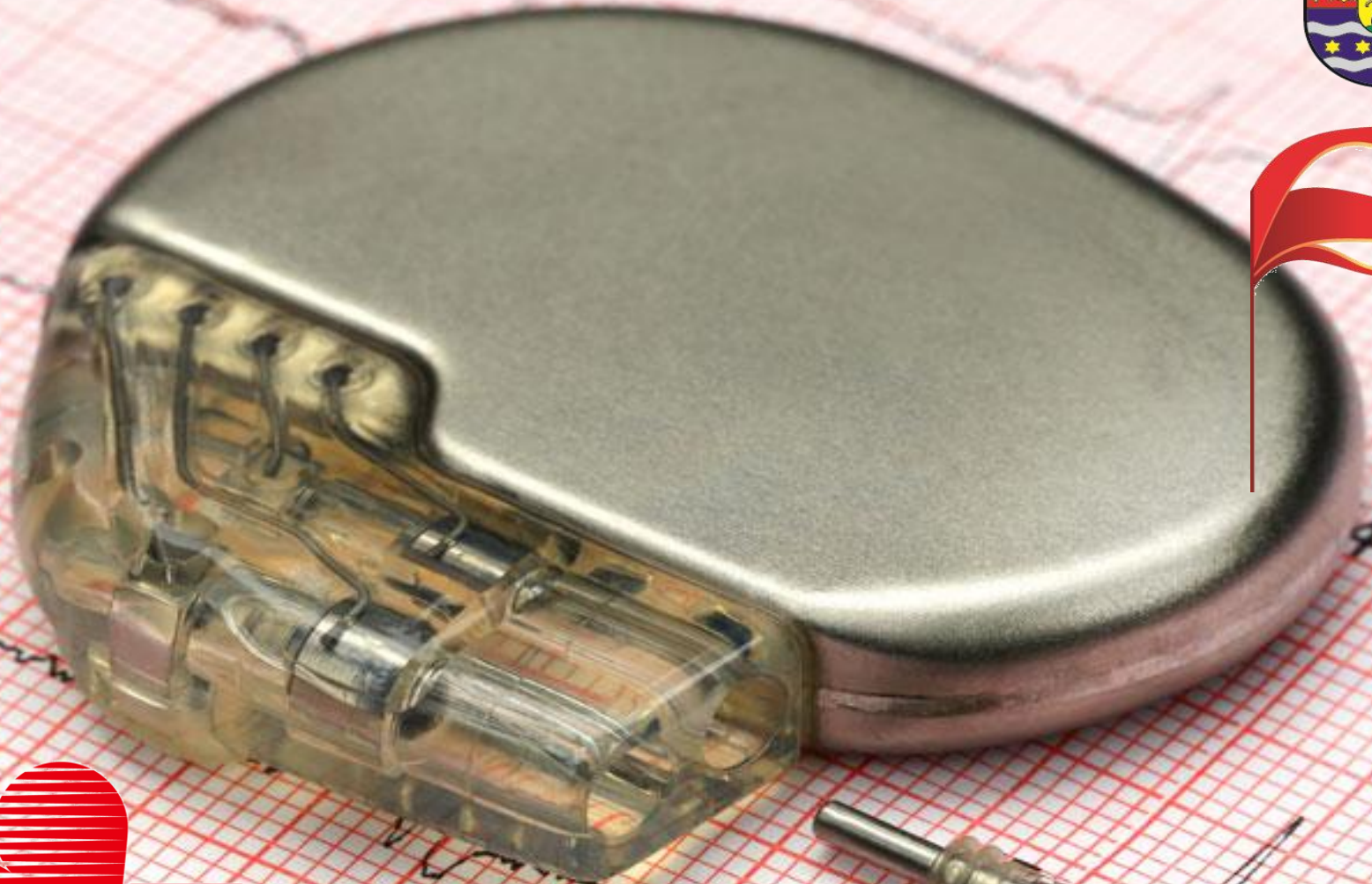
IP address v6(v4) 128-bitna struktura, $3,4 \cdot 10^{38}$ različitih adresa, 8x4

Can transfer data over a network

Electric**stimulator

subCLAVICULAR PACEMAKER...





EKG - Eelectrocardiogram



heart tec

EKG Electrocardiograph analysis work of heart u real time

Recording heart action

Analysis disturbed rythm of heart

Confirm the situation of hearth attack

HOLTER 24 hours recording actual condition of hearth

Never, ever, tested the deep of river with both legs!

Intensive care

System for monitoring vital function of human body in real time



to late situation

Hearth action

Disturbing of hearth rhythm

Pressure in veins arteries

Measure of body temperature

Measurement oxygen in the blood

Another very important high differential medical parameters

Defibrilator : vraćanje srca u rad induciranom električnom energijom
(kod srčanih aritmija)

Respirator : umjetna pluća

Dijalizator : umjetni bubreg, eliminacija štetnih tvari iz krvi

Infuziomat : pumpa za kontrolu terapije lijekovima, točno na minute pomoću infuzijske otopine daju se točno doziranje

Električni stimulator (Pacemaker) : elektro stimulator, predvodnik srčanog ritma da bude normalan, kada srce stane da mu vrati ritam



Recovery room

Standard recovery procedure after surgery event

Senzoring

Implatants with sensor functionality

for recording condition of human vital organs

They tracking actual medical condition in longer period of time. So collected data can be analyze in real time to predict the situation, they can keep the data in own memory or sended in data centar wind only one purpose prevention of problems(Boing engine, BMW 7)

normal data, algoritmi za prepoznavanje problemskih informacija

24-hours Holter-EKG (EKG holter)



- EKG holter 24 hours
- EKG holter 3 year

We can collect the data, save and keep the data, who can and knows produce the information BI



CEZIH central medical repository of medical data RH

Only usefull and save information, please!



Which analytics methods enables that we can from huge collection of data produce the **information**, in wright time, i wright place and wright purpose in our case for better medical treatment of patient



Case study: IoT RADIOLOGY

Stethoscope

Analog RTG and digitizer

Digital RTG

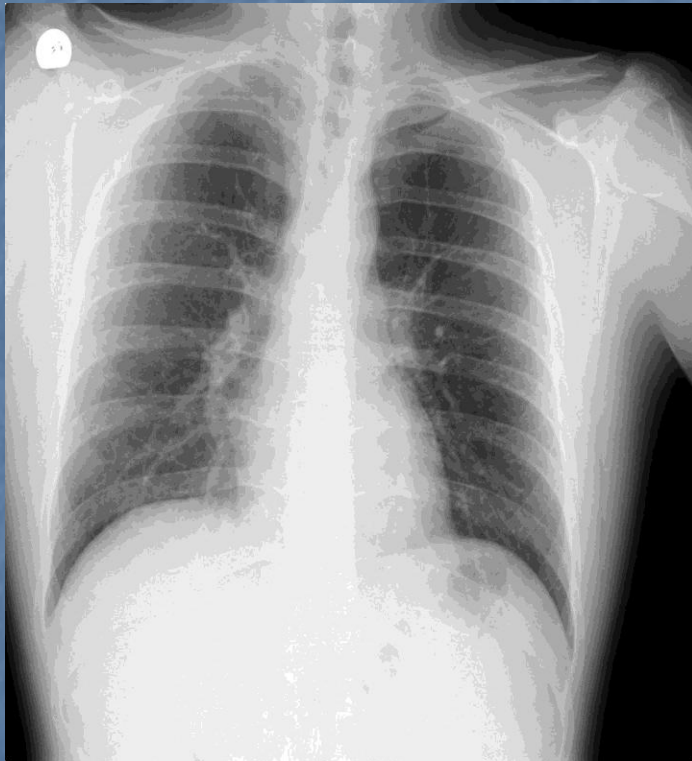
CT

MR

General hospital of Varaždin

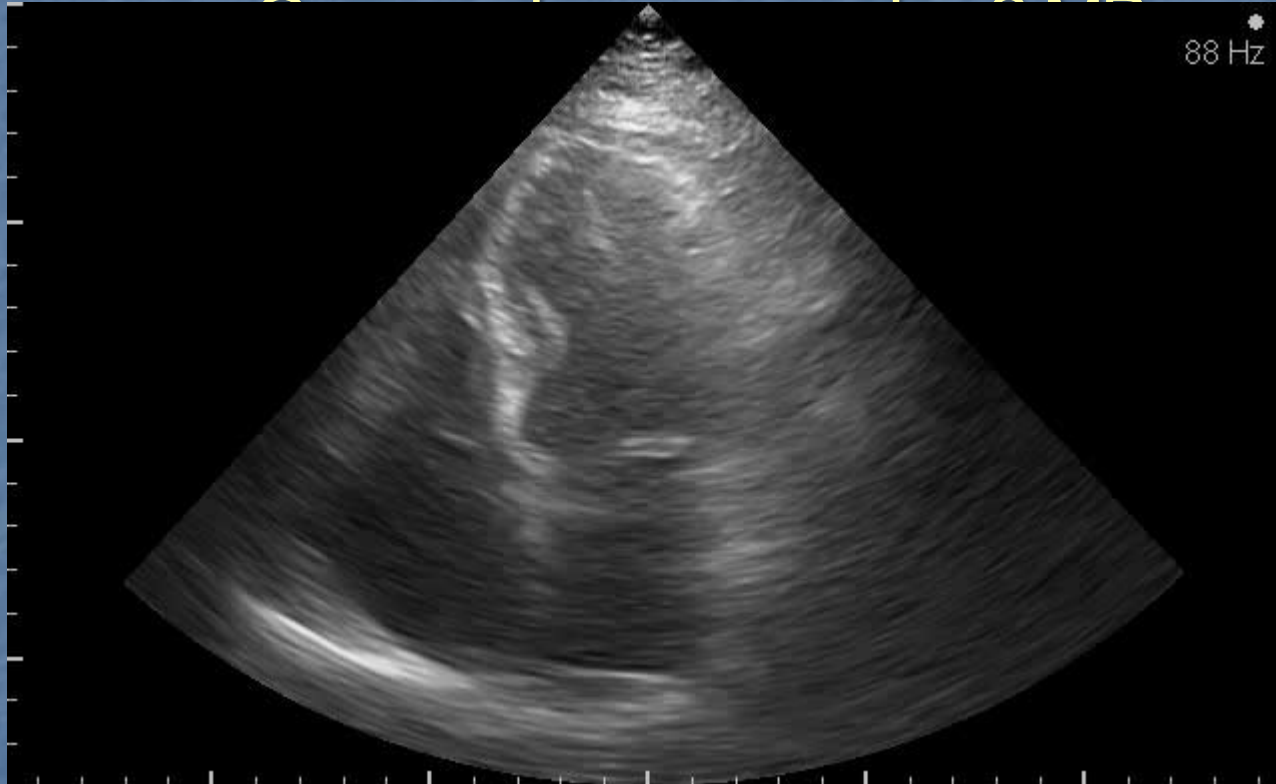
Stethoscope and text compilation

Digitized analog RTG picture



- One picture with average size of 15 MB

Ultrasound: That is life in digital format , that is hearth

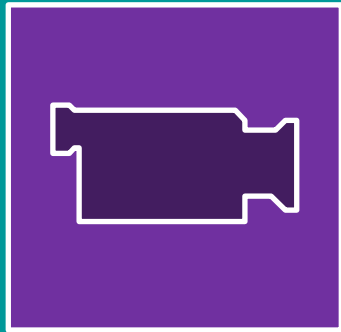


Computed tomography – CT



- In average 500 MB by review
- 300 – 1500 pictures by review

Access to radiology pictures



Access to pictures
from radiology
devices across web
link, with special
application

Pacijent

Pregled

Prilagodbi

Odjava

Izlaz

Ispis Pogled Odgovori

Osvježi Pomoć

Pacijent:

Pregled Status Upućen od Konzilij Addendum

Broj pregleda: BN

Detum pregleda:

Liječnik:

Ing/Tehničar:

Vrsta pregleda:

Uređaj:

Bilješka:

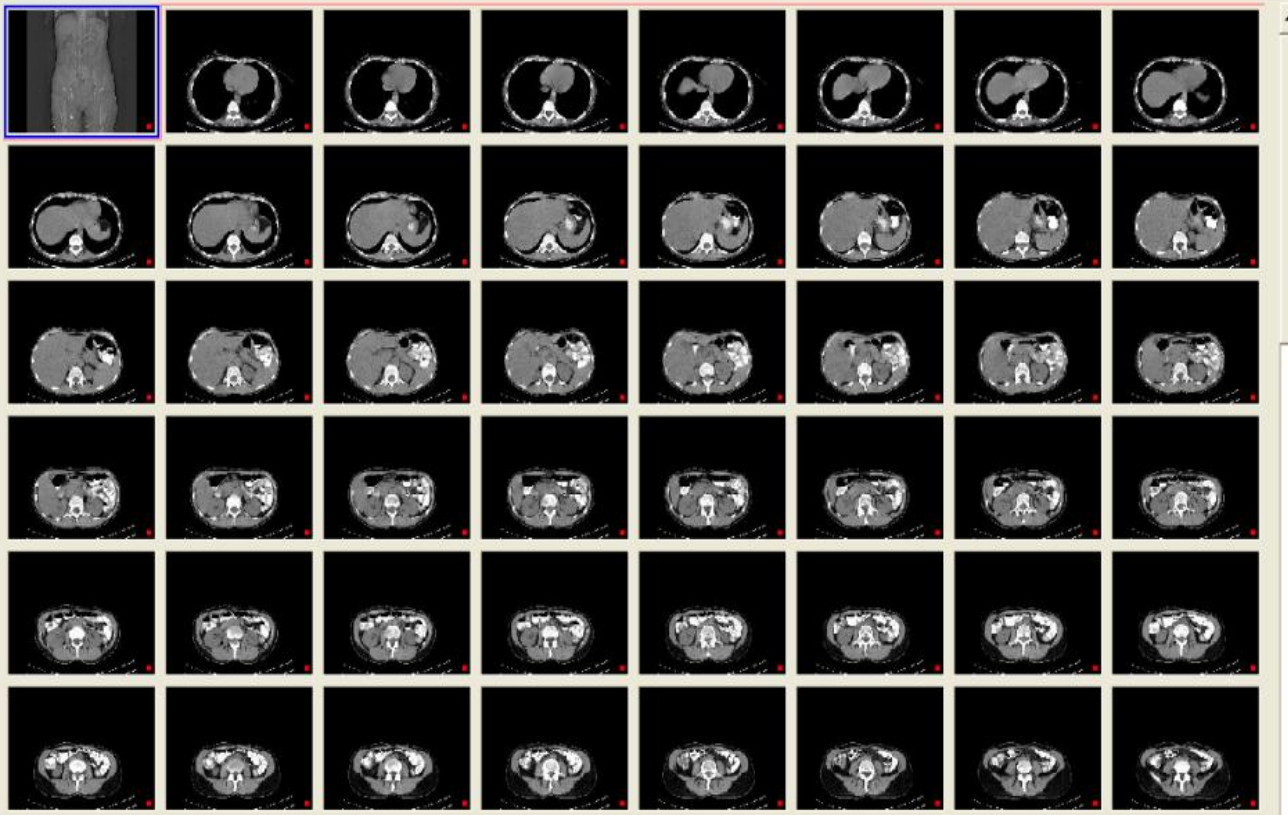
Nalaz

Datum nalaza:

Pretipkan od:

Pregledi pacijenta

Broj pregleda	Detum preg	Liječnik	Vrsta preg	Imgs
* 7962/08	26.3.2008 10:00:54	Unassigned	ABDOMEN	127



Podaci o slici Dokumenti

Šifra:

Komentar:

Broj slike:

CT – 3D reconstruction



Angiography – recording blood vessels



Magnetic Resonance – MR



Same capacity as for CT: 15 MB by segment, no radiation activity; who knows what's going on when somebody reorders the proton places in human body

A huge demand for storage capacity to save a RTG pictures

20 TB space to store RTG pictures, access for authorized personal only

(13 million 1,44" diskets)

44 milliona pictures

Half of million of review

First commercial text was sended in december 1992. year. Today, the number of sended and resived messages , daily is greather than the total human population(8 milliard)

Central data storage

Daily needs for storage space for pictures of radiology: 13-30 GB

Mirroring, Striping, Hot Swap HD, OnTheFly, Raid 10



System room

Local cloud

Computer center OBV

Data protection - replication

- Transaction data base HIS-a 128 GB
- Radiological SQL data base of patients 46 GB
- RTG pictures 20 TB, 14 GB daily
- Magnetic tape – 6 TB per unit, fire protection safe place
- Transferred to cloud – transaction data base

Virtualization of servers



- More logical computers on one "host"
 - Testing new possibilities in world of computer science
 - Creation network environment on one physical device

Virtualization and quality copy of data are the only one protection for save business activity because los of business data means heavy business disastery

Mission critical operation – data protection



How "She" collect the information:



How "He" collect the information:



Thats why we nead GDPR



General Data Protection Regulation (GDPR)

Conectivity and accessibilyti

Rules for how company,
governments and other
entities can process the
personal data of data
subjects in the EU





More rights for EU individuals: related to deletion ,
restrictions, and portability of personal data



New requirements for profiling and monitoring




Data breach
notification
and security;
report data
breaches,
more specific
security
requirements



Binding corporate rules(BCRs): The GDPR officialy recognizes BCRs(CRM-Salesforce) as a means for controllers and processors to legalize transfers of personal data outside the EU

Mission: WEB servisi

Quality

- Id data in state system only once
 - (MUP, basic, web servis)
- 

Efficiency

High pressure, sugar, alcohol or ili drugs, to much kg, exercise, Mother of wife and I on sam adres (+ 10%) (doctors, restaurant)

Kartica vjernosti: salmon.

Auto stalno u pogonu

- a) Po noći trošak
 - b) Inicijalno skup
 - c) Jedan se vozi
 - d) Car share(Uber)
- 

Goal - purpose

- Big deep data
 - Senzor logic
 - Quality of life in local community
- 

Telemedicina -turizam, nijemac
CEZIH repozitorij, electronical patient record
Microsoft Kinect tehnologija
Senzoriranje vitalnih organa svi podaci su
ispravni
Monitoring Intenzive care, Recovery room
IoT
AZOP
eVisitor

Which organization and management would like to have employeears over the world





In the meantime this presentation, with
the duration of half of hour

3 children were born in RH

196 in USA

634 in Kini

1026 in Indiji

3,280,000 songs illegally download over
the internet

End of story, finally!

A silhouette of a sailboat with two sails is centered on a body of water. The sun is a large, bright yellow circle in the background, partially obscured by the top of the sailboat. The water is a deep red color, and the sun's reflection creates a shimmering path on the water's surface. The overall scene is a sunset or sunrise.

Thanks on your time and patience!

General hospital of Varaždin

Department for computer science

www.obv.hr

informatika@obv.hr

Dražen Pomper, BSc. direction
organisation-IT

+385 (0)42 393 077

+385 (0)98 98 41 266



- ZOP



Povjerenik za ZOP

Nadzor nad zbirkama podataka

Mora imati znanja iz informatike,
ekonomije, medicine, prava

Odobrenje korisnika o upravljanju sa
njegovim podacima, **Windows XP**

Kazna: 4% od prometa ili 10 mil. €

Nova direktiva EU o ZOP-u aktivira od
25.05.2018.

Visok stupanj sigurnosti?

Sigurna platforma klijentske platforme



- ▶ Windows XP SP3,7
- ▶ Windows 7, Windows 10

Siguran pristup vanjskih korisnika



- ▶ Mrežna sigurnost
- ▶ VPN, https:
- ▶ Microsoft Firewall ASA Server CISCO

Zaštita korisnika i infrastrukture

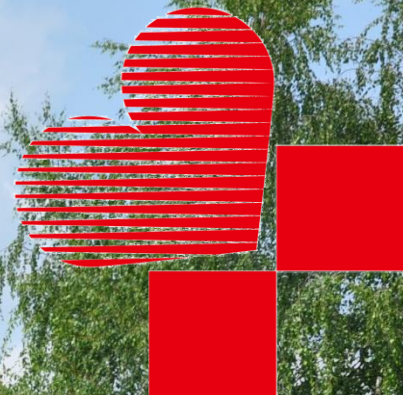


- ▶ Mozilla Firefox 6.5
- ▶ Internet Explorer 11
- ▶ Proxy control the trafic on Internet
- ▶ Chrome 58.0

Zaštita podataka od neautoriziranog pristupa



- ▶ Autorizacija
- ▶ Autentifikacija
- ▶ Antivirusni program Nod32



PacemaWEB servis OsigInfo HZZO

Svakodnevni "down load" 4, 5 mil. osig. (6:00)

Upotreba telefona u neposlovne svrhe

Metronet – nadzorni centar za usluge
fiksne telefonije

Nedjelja, 20:14, 385 800 82 28.,
odgovornoj osobi na mobitel

broj 042/406-2XX

razine ili tarife, radi se o iznosu od 20-30 kn,

išlo je usmeno upozorenje prije 2 mjeseca

Posebno obratite pažnju

- Bankomat – blokada izlaza novca
- Replikacija platne kartice

Upravljanje bolničkom apotekom

pacijentu i bolničko osoblje
Oprema
Lijekovi
Nadzor nad procesima distribucije i upotrebe
lijekova

Spriječiti mogućnost

zamjene identiteta

Bolnička narukvica

403 sporne osobe

Kontrola poslovnih procesa i dokumentacije

- **Pomper** nadzire sve poslovne promjene u Općoj bolnici Varaždin
- **Pomper** jedini zna vjerodajnice za pristup poslužiteljima što je vrlo opasno ili ekvivalentno kao da zna jedini kodove za lansiranje nuklearnih projektila (atest od ludila)
- **Tko kontrolira Pompera**
- Što se događa kada **Pomper** postane preopterećen



Cijenim lojalnost prema vodstvu kuće

- Posebno prema ustanovi u kojoj radim 27 godina
- Genetska predispozicija za izdaju

Kakvi ljudi u informatiku zdravstva

■
će znati prepoznati što treba korisniku za optimalan razvoj svoje produkcije i to na temeljima kvalitetnog IT