SANKARA NETHRALAYA

Scanners

Appln Server

Wi-fi

PCs

???

TCs

Backup Server

Network

D. Pen

EMR
– Software & Hardware

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Pieces of Puzzle

- Software

- Hardware

- Soft-Hard-Ware

- How to go about?

S/w & H/w

- Software?   - Mind

- Hardware?   - Money

Software

Front End
- VB
  - Easy
  - Inexpensive
- Java/ J2EE
  - Cost effective

Software

- Java/ J2EE/ .Net
  - Integration
  - Web based
  - Internet Browser
  - Internet + VPN

Software

Back End
- Linux
  - Redhat

- MS 2000

- Unix

Software

Database
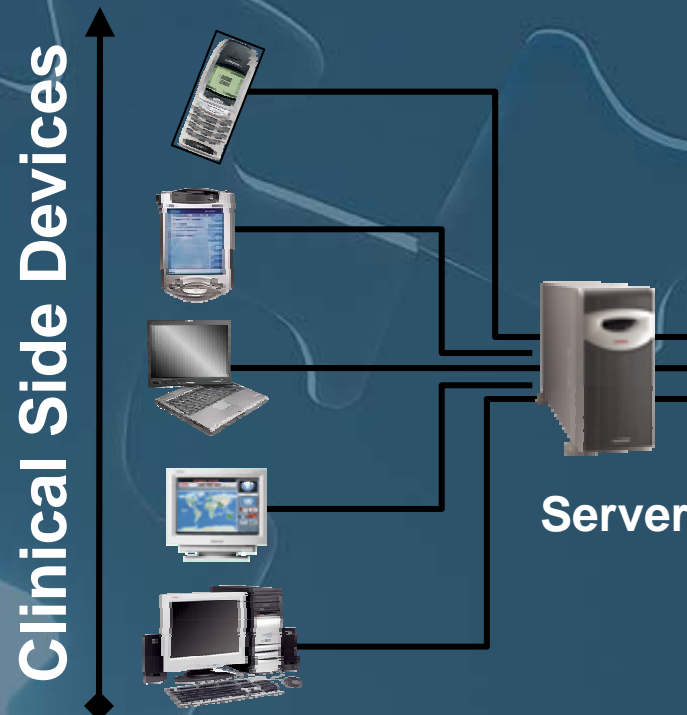- Oracle

- MS – SQL 2000

- DB2

- Interbase

Software

- To comply with Standards
  - HL-7
  - DICOM
  - CPT for Surgical Procedures
  - SOAP (Protocol)
  - HIPA for Insurance
  - NABL (National Accreditation Board for Labs)
- Interface with other applications

H/W– Clinical Aspect

- TCs
- PCs
- Digital Pad
- PDA
- Scanners
  - Document
  - Film

Clinical Side Devices

Server

H/W– Clinical Aspect

- Interfacing hardware with equipment
  - Imaging Equipment
    - Fundus Camera, OCT, HRT etc
  - Diagnosis Data Equipment
    - HFA, Auto-Ref, Auto-Keratometer, DBR etc

- Wireless Network
  - Security

H/W- IT Systems Aspect

- Server
  - Application
  - Database
  - Backup
  - Others

- Desktop Workstations
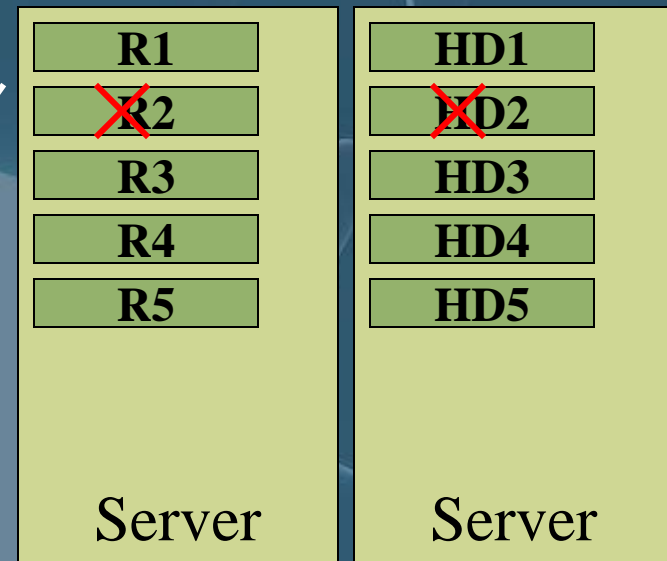
H/W- IT Systems Aspect

- Hardware
  - High processing speeds to run difficult networks
  - High storage capacity
  - Although equipment will continue to become more compact, faster & cheaper – What is purchased today will work effectively in office for next 5yrs.

Hardware

- Storage
  - Typical EMR Requirement 3 Terabytes in 2 to 3 years
  - Scalability upto 5 TB
  - Archiving Policy
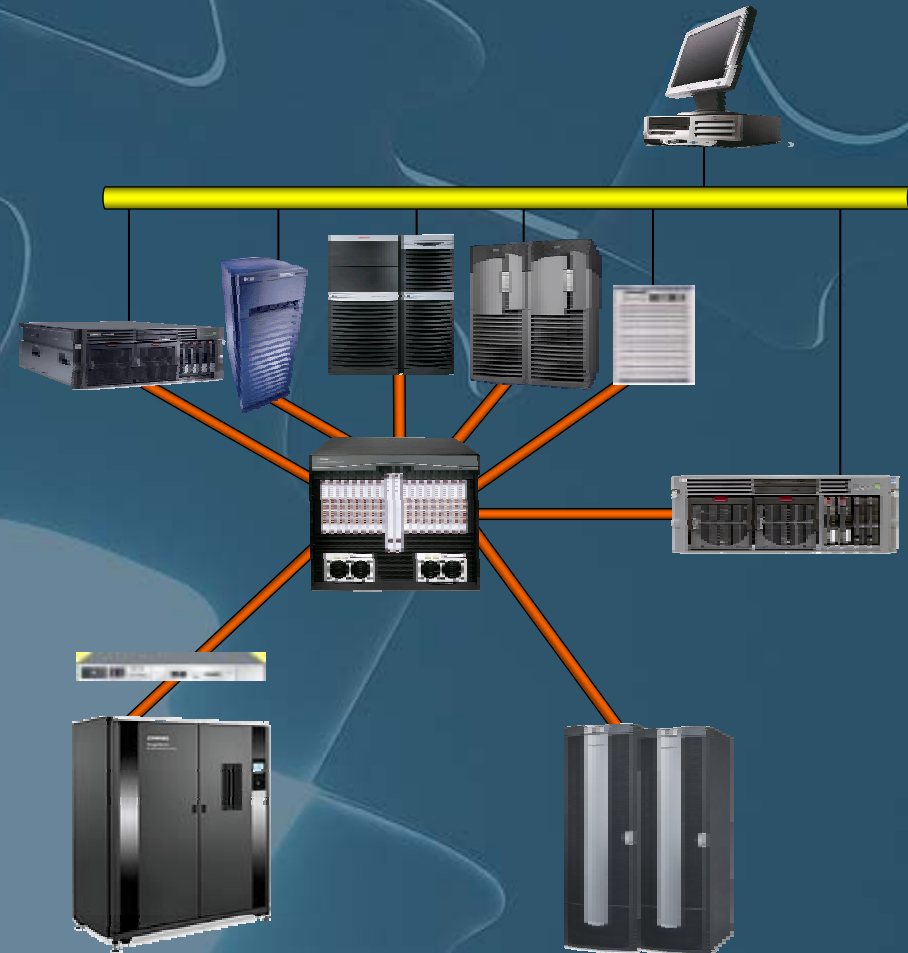   - Online
    - Offline
    - Inline

Hardware

- Storage
  - High Availability
  - Proven track-record
  - Depends on criticality
  - Basic
    - Redundant Array of Inexpensive Disks- RAID
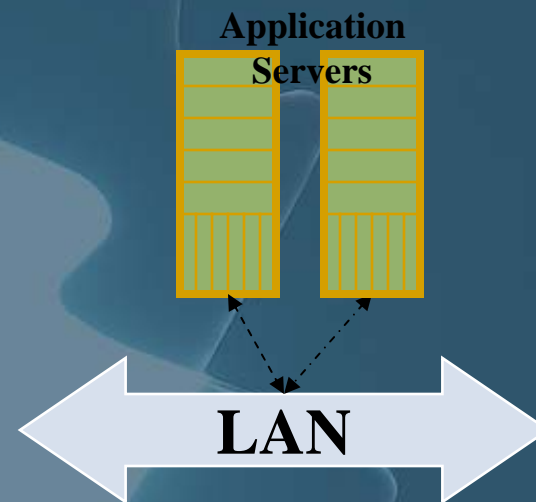   - RAID Level 5

R1
~~R2~~
R3
R4
R5

Server

HD1
~~HD2~~
HD3
HD4
HD5

Server

Hardware

- **Storage**
  - **Sophisticated**
    - SAN
      - Ideal
      - Expensive

Hard-Soft-Ware

- Redundancy/ Load Balanced

  - Application Server

  - Database Server

Application Servers
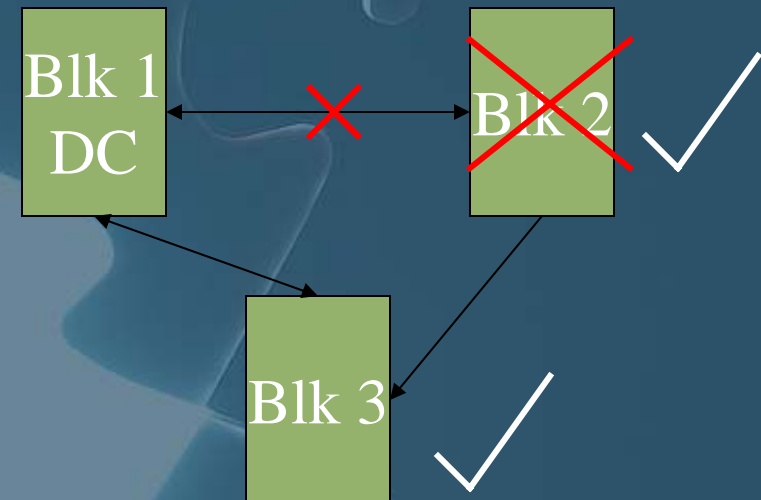

LAN

Hard-Soft-Ware

- Redundancy/ Load Balanced

  - Networking
    - Switches
    - Connectivity

  - Power
    - UPS for an UPS

Hard-Soft-Ware

- Backup Policy
  - Log backup
    - Typically 15 mins
    - Disk to disk

  - Overall backup
    - End of the day
    - Disk to Disk to Tape
      - HD-HD-ALT

H/W- IT Systems Aspect

- Network
  - Design addressing the extra-Bandwidth Requirements
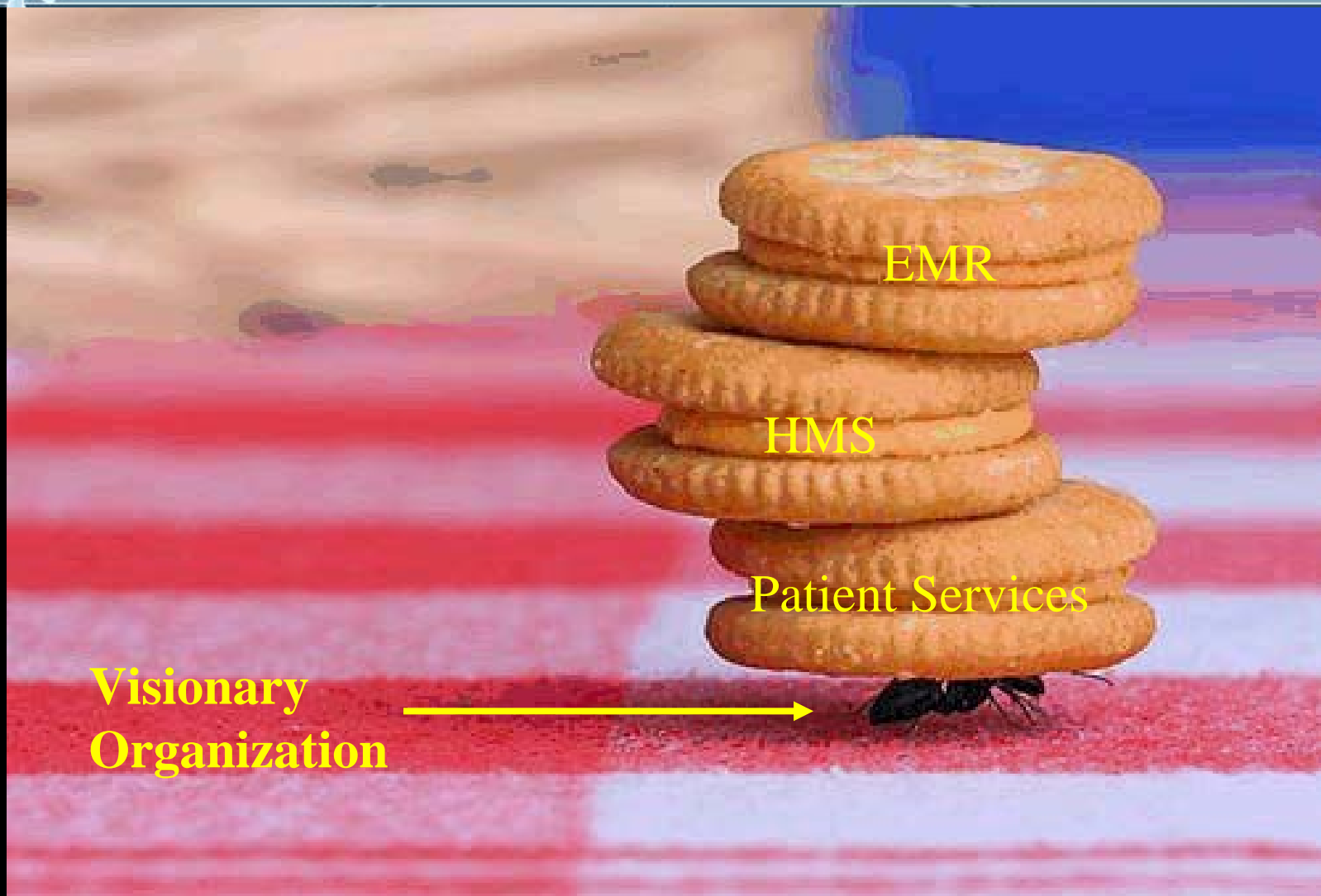 - Redundancy

- Disaster Recovery

When to go for EMR?

1. Starting a new clinic
2. Remodelling a old clinic
3. Adding a remote clinic
4. Availability of funds
5. Current billing or scheduling software needs updating
6. Concerns about the practice's ability to meet the Health care financing administration's billing guidelines and to provide appropriate legible documentation

How to go about?

1. In-house/ Out-Sourced
2. Analysis of the current system
3. Depicting the required system
4. GAP!
5. Identifying the developers
6. Process of making it
7. IMPLEMENTATION (Plan & Execution)
8. Maintenance

EMR

HMS

Patient Services

Visionary Organization →

Thank You!

Need?

Need = Requirements + Expectations

Need

- Requirement
  - Medical Record (Physical)

- Expectations
  - Image Management
  - Direct Data Acquisition
  - Intuitive

S/W- Clinical Aspect

- Data Interfaces
  - Other packages
  - Equipment
    - Slit Lamp Imaging, Fundus Imaging, HRA/ HRT/OCT/ GDx & others
    - Auto-Ref data, DBR/ Keratometer Values, Perimeter Data, etc

- Avoid dead data!
  - Documents as images
  - Images without any search-ability

S/W- Clinical Aspect

- Standards
  - **ANSI HISPP**
  - **ANSI HISB**
  - **CPRI**
  - **FESMCC**
  - **HIMA**
  - **HIMSS**
  - **HOST**
  - **MRI**
  - **NIST**
  - **WEDI**
  - **ANSI ASC X12**
  - **ASTM Committee E31**
  - **HL-7**
  - **HIBCC**
  - **IEEE**
  - **NCCLS**
  - **DICOM**
  - **NCPDP**
  - **NISO**
  - **NUBC**
  - **ACGIH**
  - **Facct**
  - **JCAHO**
  - **NCQA**
  - **URAC**
- **DHHS Data Council**
- **HISSB**
- **NCVHS**
- **CEN/TC 251**
- **EDIFACT**
- **ICE**
- **NAHDO**
- **NAPHSIS**
- **NASIRE**
- **NHIRC**
- **COSTART**
- **CPT-4**
- **HCPCS - HCFA**
- **ICD**
- **AICD-10 CM**
- **ICIDH**
- **ICPC**
- **LOINC**
- **NDC**
- **SNOMED**
- **UMLS**
- **LTCCUDS**
- **MDS**
- **UACDS**
- **UHDDS**

S/W- Clinical Aspect

- Standards

- **CPT-4 - Current Procedural Terminology**

- Created and maintained by the American Medical Association, which holds the copyright. Required for reporting of outpatient procedures and physician services in the United States.

How to purchase an EMR?

- Software not able to offer similar guarantees as Hardware companies

- Need a successful software company who can offer a long-term technical support and frequent updates.