

Web-Based PACS and EHR

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netDICOM

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Where Does Your EHR Data Reside?

- Scattered over several Institutions - This data is primarily of two types:
 - Textual
 - Graphical - DICOM Images



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 - Textual
 - Billing
 - Scheduling
 - Laboratory test results
 - etc.
 - Graphical - DICOM Images



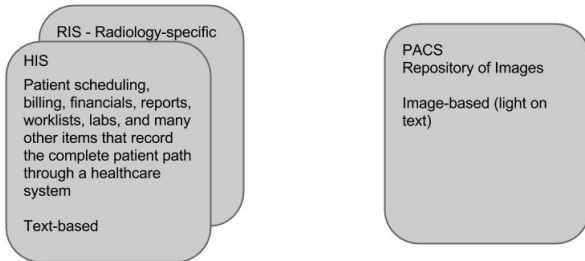
Where Does Your EHR Data Reside?

- Scattered over several Institutions - This data is primarily of two types:
 - Textual
 - Billing
 - Scheduling
 - Laboratory test results
 - etc.
 - Textual information can be stored in relational databases, and securely accessed using a variety of standard protocols.
 - Graphical - DICOM Images
 - Impractical to transfer large numbers of DICOM medical image files over any type of network
 - Availability of low-cost DICOM viewers for diagnostics is a challenge.



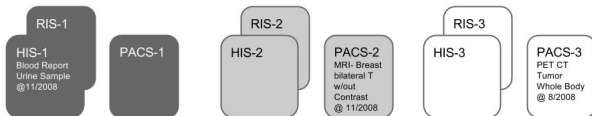
Types of Clinical Information Systems

- Types of Clinical Information stored in various systems



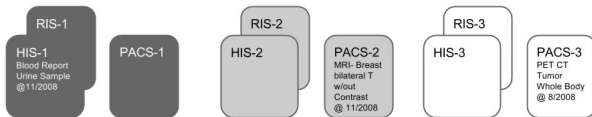
Patient Health Records Scattered

- Type of Clinical Information stored in various systems



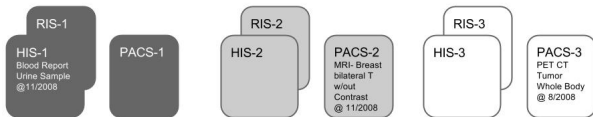
Patient Health Records Scattered

- **Type of Clinical Information stored in various systems**
- Institution 1 HIS: Primary Care
 - Annual blood and urine test along with the history
- Institution 2 PACS
 - Breast MRI
- Institution 3 RIS/PACS
 - Admission Details



Patient Health Records Scattered

- Type of Clinical Information stored in various systems
- Institution 1 HIS: Primary Care
 - Annual blood and urine test along with the history
- Institution 2 PACS
 - Breast MRI
- Institution 3 RIS/PACS
 - Admission Details
- Physician orders new MRI since previous investigation results are “hidden”



Cloud-based EHR on netDICOM

Patient health records are consolidated across different institutions and presented

MRI Bilateral with T wout Contrast
Study Date: 11/11/2008
▶ Study Information ▶ Image Series

PET CT Tumor Whole Body
Study Date: 8/1/2008
▶ Study Information ▶ Image Series

PET CT TUMOR, WHOLE BO
Study Date: 8/1/2008
▶ Study Information ▶ Image Series

MRI Breast Bilateral T without contrast
Study Date: 6/24/2008
▶ Study Information ▶ Image Series

Inst 2

Inst 3

Inst 1

Patient Name: Mrs. Jane Doe
DOB: 10/17/1949
Gender: Female
Notes:
Pt is a 66 y/o female s/p hospitalization at Medical City due to AMS and debility. PMHx includes: HTN, hyperlipidemia, breast CA, s/p R breast mastectomy 2007, chemoradiation, s/p R frontal craniotomy for tumor, stage IV small cell lung ca with multiple brain mets and R hilar mass, s/p whole brain radiation and 2-3 rounds of systemic chemo. D/C Plan: Pt to return home with husband with increased strength to resume her PLOF Severe chest pains. Pneumonia symptoms. Non smoker. 8/1/2008 PET, CT Tumor, whole body Lungs, Chest 11/1 MRI Breast



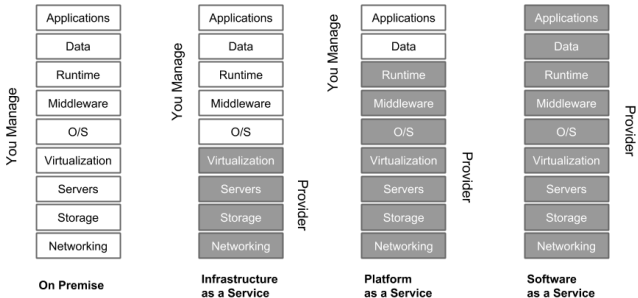
Cloud-based EHR Solution

- Move the medical image files from a LAN-based PACS to Cloud
- Cloud-based solution is a flexible pay-as-you-go platform that provides for scalable growth as and when needed
- Patient information consolidated across different institutions for viewing



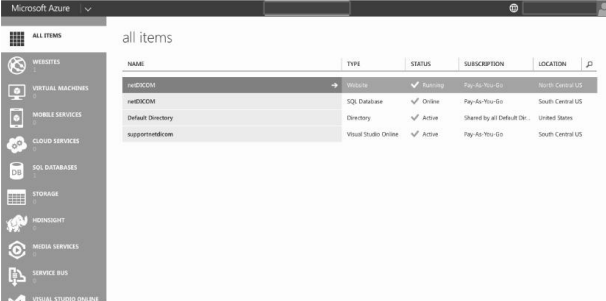
LAN-Based PACS to Cloud

Transitioning from a LAN-based solution to Cloud



Pay-As-You-Go Model

Minimal components required to form a Cloud based service



The screenshot shows the Microsoft Azure portal interface. On the left is a navigation pane with categories like WEBSITES, VIRTUAL MACHINES, MOBILE SERVICES, CLOUD SERVICES, SQL DATABASES, STORAGE, HDINSIGHT, MEDIA SERVICES, SERVICE BUS, and VISUAL STUDIO ONLINE. The main area displays a table of resources under the heading 'all items'.

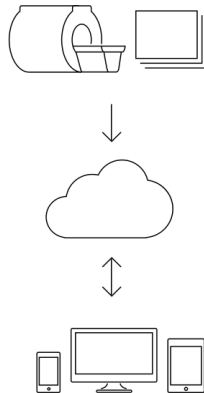
NAME	TYPE	STATUS	SUBSCRIPTION	LOCATION
netDICOM	Website	✓ Planning	Pay-As-You-Go	North Central US
netDICOM	SQL Database	✓ Online	Pay-As-You-Go	South Central US
Default Directory	Directory	✓ Active	Shared by all Default Cl...	United States
supportnetdicom	Visual Studio Online	✓ Active	Pay-As-You-Go	South Central US

Additional Components can be added easily



netDICOM on Microsoft Azure

- Upload DICOM's over the Web
- Read DICOM header
- Extract and store information to a Relational DB
- DICOM's stored in native format
- Allows exchange of reports and DICOM's using standard protocols



DICOM Image Display



- View images on a Zero Footprint Viewer
- No downloads needed on any device



Web Services for Exchanging Data

Information from multiple institutions can be obtained using Web Services (SOAP, REST)

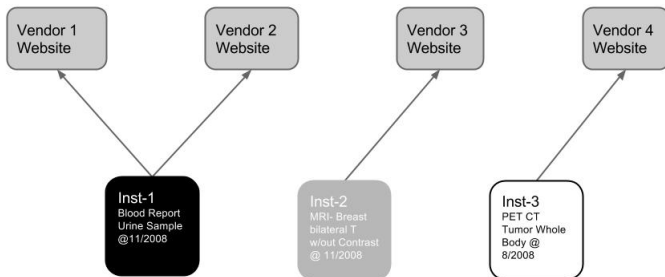


Figure: Schematic showing types of clinical information in various systems

FHIR/HL7 Information Exchange



HL7 Protocol allows websites of different vendors to talk to each other

```
<ns0:ADT_A04_22_GLO_DEF
xmlns:ns0="http://netDICOM.net/HL7/2X">
<EVN_EventType>
  <EVN_1_EventTypeCode>A08</EVN_1_EventTypeCode>
  <EVN_2_DateTimeOfEvent>201401080623</EVN_2_DateTimeOfEvent>
  <EVN_3_DateTimePlannedEvent>201401080823</EVN_3_DateTimePlannedEvent>
  <EVN_4_EventReasonCode>01</EVN_4_EventReasonCode>
</EVN_EventType>

<PID_PatientIdentification>
  <PID_1_SetIdPatientId>3175875</PID_1_SetIdPatientId>
  <PID_2_PatientIdExternalId>
  <PID_5_PatientName>
```

Figure: Schematic showing types of clinical information in various systems



Conclusion

PACS and EHR Migrate to Cloud

- Key barrier to accomplish this migration is to combine data residing on multiple institutions and combining with the images that reside on PACS.
- Cloud-based PACS that exchanges information with other systems in a secure manner using open standards, the ability to present a consolidated view of a patient's information in its entirety is achieved.



Thank You

Hello

