Redacting PHI in Neurological Images using XNAT

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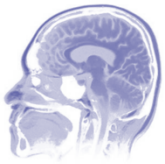


The Problem

- Large-scale studies have huge amounts of data (1PB/3Yrs)
- Data shared must ensure privacy of subject (HIPAA)
- Inter-organizational collaboration must be easy
- Data exists as multiple abstractions, and simply removing it from a single layer is insufficient
- Tool is needed to specifically redact entire data stack of PHI and share data

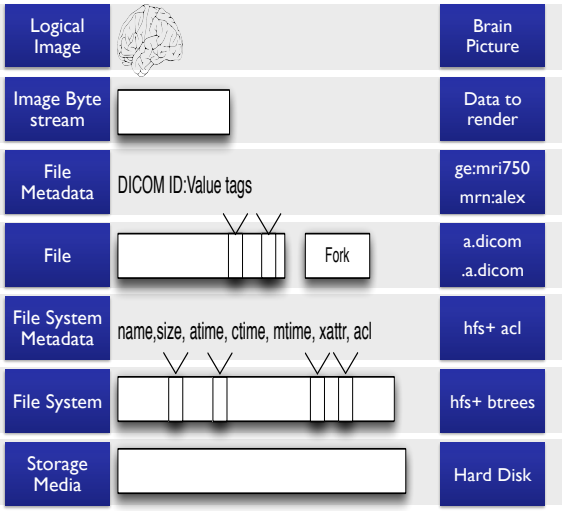
Why redact?

XNAT Background

- Neuroimaging data management platform www.xnat.org
- Combination relational database and file data store
- Remote data processing/execution pipepine
- Jakarta Turbine Web Application Framework / REST Interface
- Java with XML configuration files
- PostgreSQL database and Unix filesystem file store

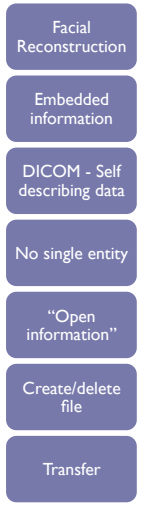
Data Stack

- Logical (not architectural or physical) break down of different storage and display components
- Bottom up approach to understand what contains PHI



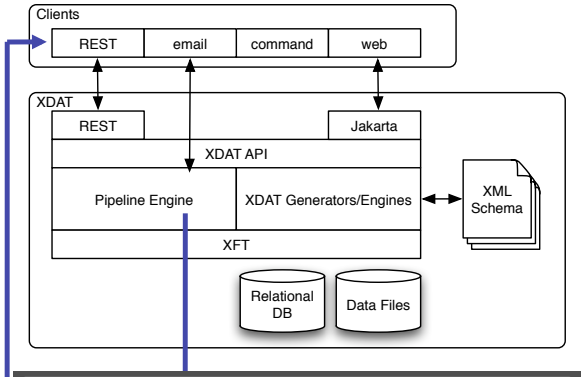
Issues

- Neuroscience
- Operating Sys
- Forensics



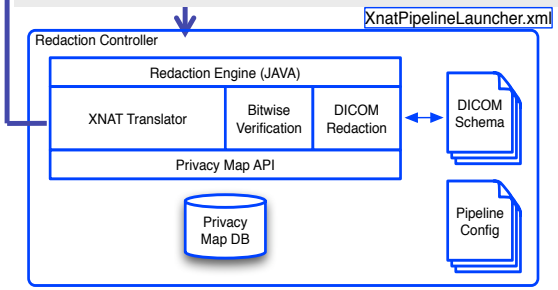
XNAT Architecture

- Developed as separate units:
  - Clients (Turbine/REST/E-mail)
  - Core (XML configured/Java middleware)
  - Pipeline (XML configured/implementation independent)

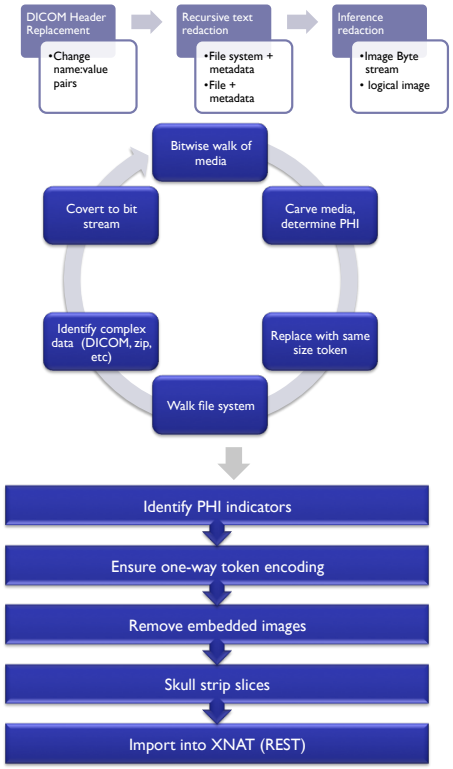


Modified/Added Architecture

- Builds upon XNAT pipeline interface (XML/Java/Python)
- Input: subjects with full scan data (DICOM)
- Output: mapped subject identifiers coupled to redacted images



PHI Redaction Engine



Discussion + Future Work

- Architecture and implementation of issues presented in poster at USENIX Security 09
- Comprehensive redaction is combination of recursive redaction at the block and file layer, with additional techniques to find and reduce inferred data such as DICOM
- Based upon body of work and code for legal production
- Project is started with goal to finish by August 2011

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