



Innovative Artificial Intelligence Solutions

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**Xen Patient360.AI - an Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning based solution for a patient centric integration, reporting and analytics of electronic health record datasets with a goal towards precision medicine.**

### Overview

Electronic Health Records refers to digital records of all aspects of patient care. These datasets encompass patient information, lab tests, radiology, prescriptions, claims, nutrition and lifestyle information, family history, genetic data and transcription data among others. Additional datasets are expected with advances in personal medical devices like wearables, implants and nanorobots. This wealth of data is expected to improve the quality of care for the patient. Managing these disparate datasets which may or may not share a unique patient identity makes the data management process challenging. Implementation of patient privacy protocols for different groups of users is another challenge.

At Xen.ai we wish to create a patient centric record that ties together all the datasets seamlessly.

Xen.ai also commits to using open source software and tools so as to not lock clients into proprietary cost traps. Maintenance and ownership of software when fully implemented can be transferred to the client or another party.

### Goals of Xen Patient360.AI Solution

1. To create a unique patient record that maximizes data retrieval for patient from different datasets.
2. To create reports on patients protecting their data privacy for different groups of users.

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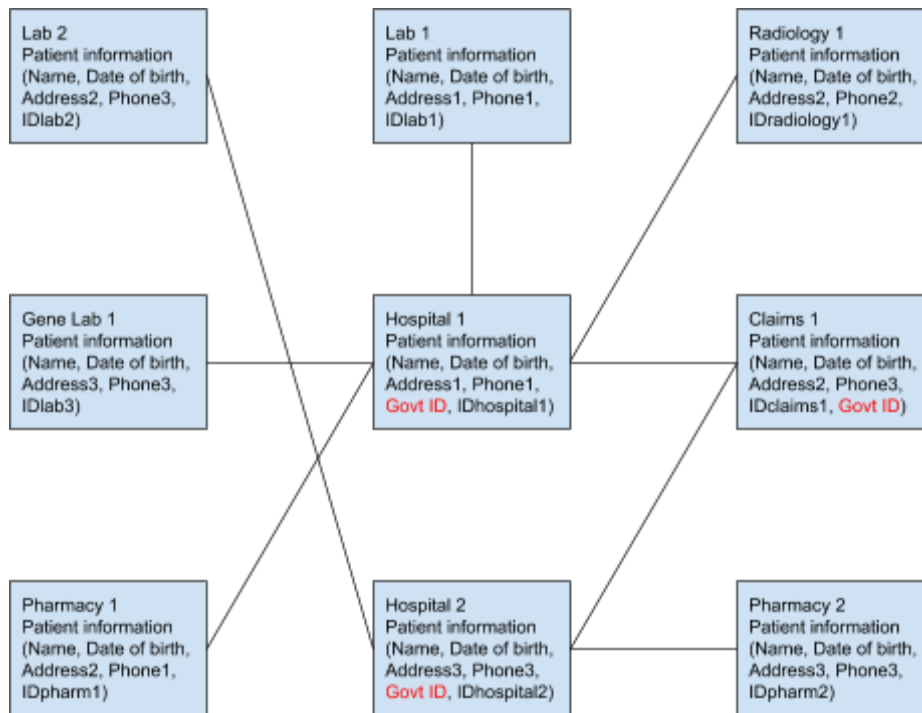
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3. To provide analytics and insights into datasets to enable physicians to make better care decisions.
4. To create predictive AI models for preventive care.
5. To create a platform so that real time data can be accessed on mobile, desktop, tablets at any time.

### Xen Patient360.AI Solution Overview

#### Patient Identity



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A hypothetical example above shows the difficulty in combining datasets that don't share a unique identity key for a patient. Hospitals don't share their patient records automatically. Typically records are requested from one hospital to another and a response received for a specific request. Any update to a patient record needs a subsequent request. Assuming that all these datasets are available at Hospital 1, putting them together without a unique key is difficult. The tuple (Name, Date of Birth) is only 92% accurate. There is collision on 8% of data.

Xen.ai will do identity information fuzzy matching to create a unique patient identity record that ties these datasets together. A unique patient record will generate a surrogate key that will point to primary keys in each dataset for that patient.

### **Reporting and Analytics**

Patient data in a hospital will be accessed by different groups of users - Physicians, Nurses, Schedulers, Claims/Finance, Lab technicians, Pharmacy, Therapists, Non-clinical (Admin, Food services, HR, Case Management, Clerical, Environment Services, IT, Device technicians). It is important to ensure that data accessed by a user in a particular role complies with federal laws.

Xen.ai will implement data access in all levels of its platform with strict access control implemented in the database or storage layer.

Reporting of patient data in real time is necessary on different devices used in a hospital environment. Given that many roles are highly mobile in a hospital environment, it is necessary that an application exists on mobile devices that enables access in a secure manner to patient records for authorized users.

Xen.ai will create a mobile application for certain groups of users but not all and will have interfaces tailored for their role. In future, an NLP based interface is envisioned for this application.

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Critical use cases for physicians are listed below:

- List of allergies
- Medications in chronological order
- Lab results with time series (historical) information
- Highlight abnormalities in lab results
- Radiology imaging results with notes from radiologists and AI (AI application is part of Xen Medical360.ai)
- Information on drugs, availability and estimated cost
- Predict medication non-adherence and/or anomalies from lab and clinical data
- Out of pocket costs for a patient

Set of use cases and interface will differ for different groups of users.

Analytics use cases for cohorts with cost information are typically desired for non-clinical users. Historical data on drug pricing, laboratory procedure costs, patient satisfaction and supply chain optimization are high in priority for non-clinical use cases. Some clinical use cases for predictive analytics are listed below:

- Risk scores for patients with chronic illness for hospitalization
- Prediction of hospital readmission
- Prediction of suicide and self harm
- Detect opioid or other drug abuse (blood tests, pharmacy transactions)

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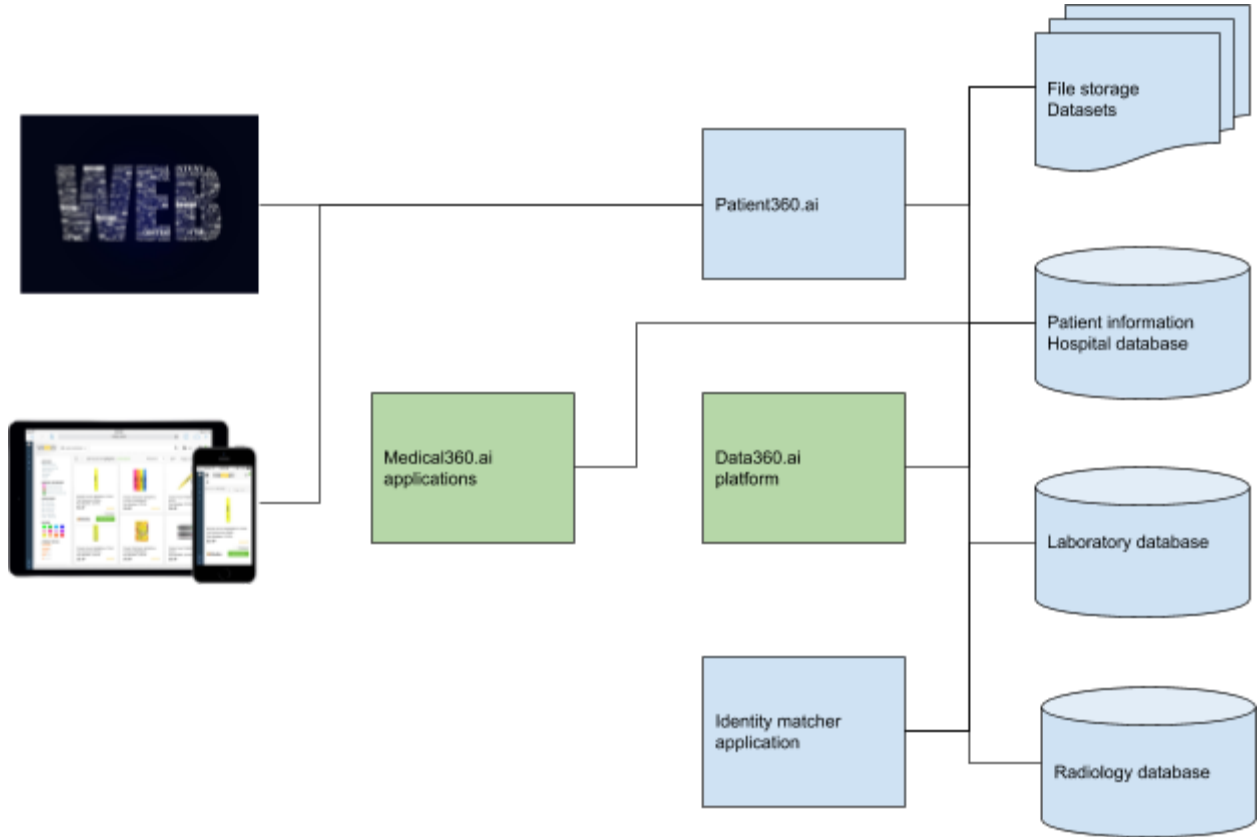
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### Xen Patient360.AI Solution Architecture



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### Key Benefits of Xen Patient360.AI Solution

In many surveys of EHR systems, physicians have overwhelmingly said that the EHR system needs an overhaul. It doesn't help them for disease prevention/management, clinical decision support and patient engagement (source: [Stanford Medicine](#)). Almost half agree that EHR systems detract them from clinical effectiveness. These facts scream opportunity for Xen.ai in the EHR space. Although there are many players in this space, we believe our key identity matching solution and well architected set of applications based on open source will improve satisfaction from physicians

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