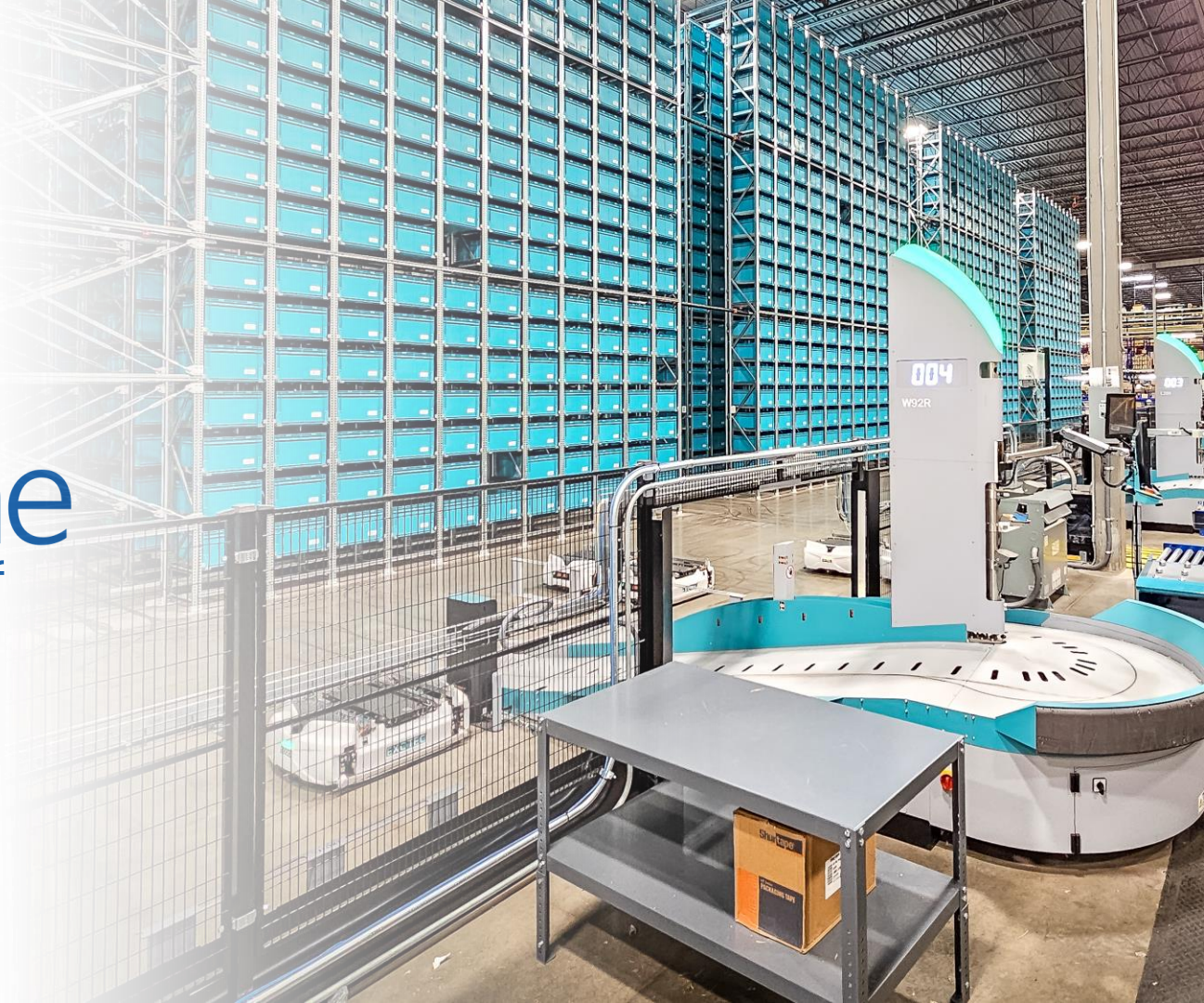




IntraOne

A Unified Platform of
Software, Services
& Technologies

High-level Architecture

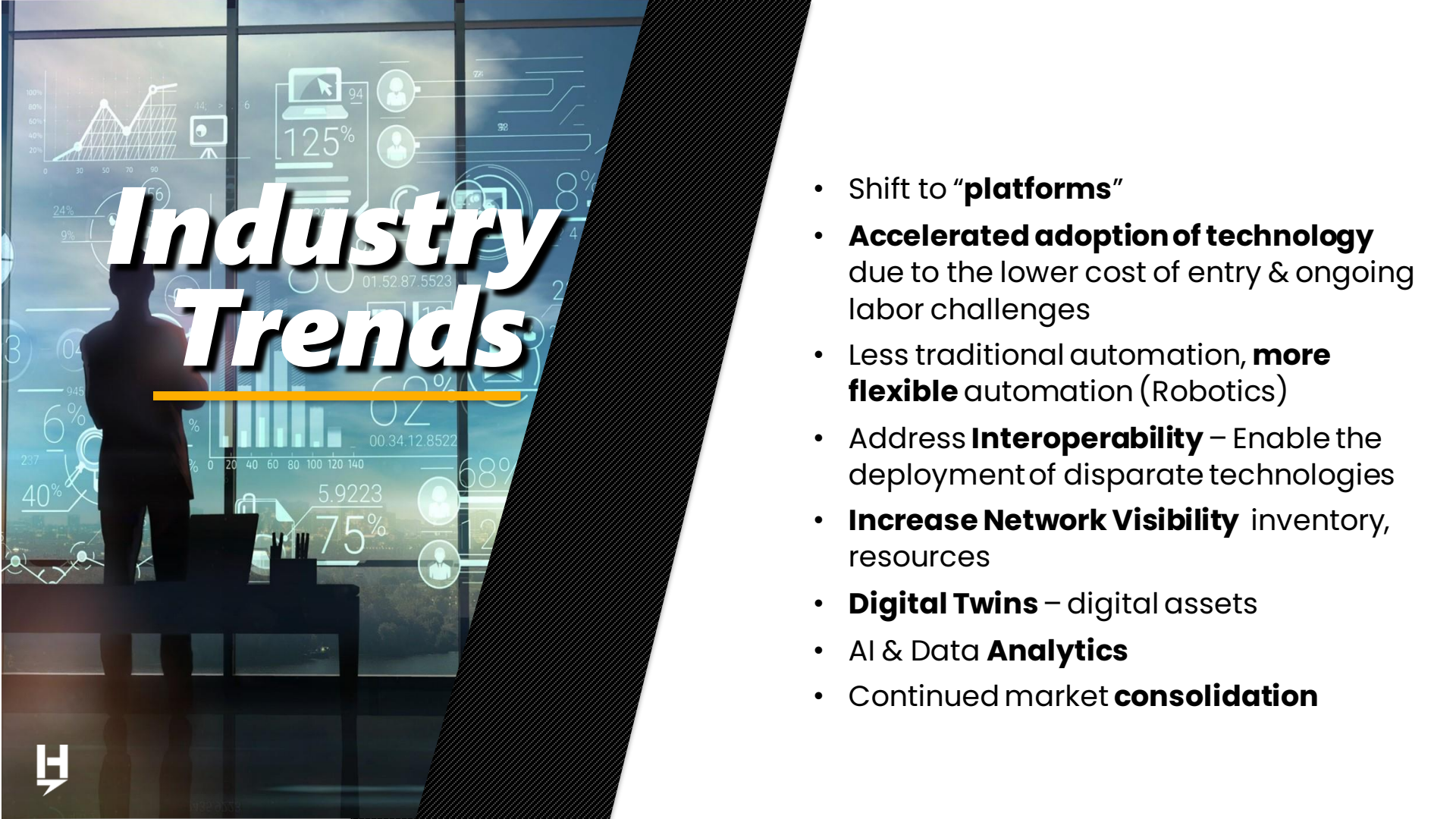


IntraOne

A Unified Platform of
Software, Services
& Technologies

Hy-Tek
INTRALOGISTICS





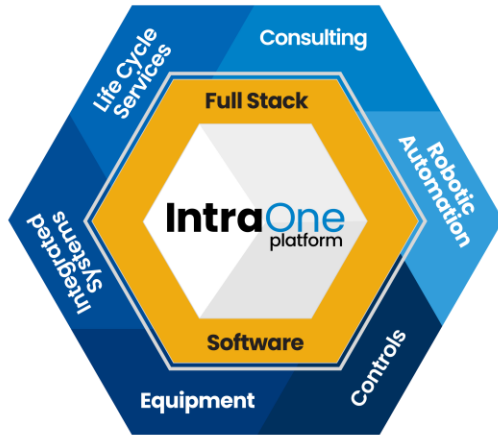
Industry Trends

- Shift to “**platforms**”
- **Accelerated adoption of technology** due to the lower cost of entry & ongoing labor challenges
- Less traditional automation, **more flexible** automation (Robotics)
- Address **Interoperability** – Enable the deployment of disparate technologies
- **Increase Network Visibility** inventory, resources
- **Digital Twins** – digital assets
- AI & Data **Analytics**
- Continued market **consolidation**



IntraOne Platform

plat-form | noun: a collection of information, products, and services that provides a foundation upon which an organization can grow and succeed



Our Platform Advantage

We are the one provider you can depend on by committing to the following:

- **Embracing** the current status of an organization's unique journey.
- Enabling a **cohesive long-range** strategy
- Streamlining engagements **using in-house expertise**
- Using data to support **technology selections**.
- Empowering organizations with **actionable data**.
- Leveraging R&D to identify **best-of-breed technologies**
- Maintaining a **neutral position** & focusing on the best solution
- Optimizing performance with leading-edge **Full Stack Software** Solutions to **connect** technologies and **empower** better outcomes.



IntraOne Application Stack



IntraOne WCS

Warehouse Control System

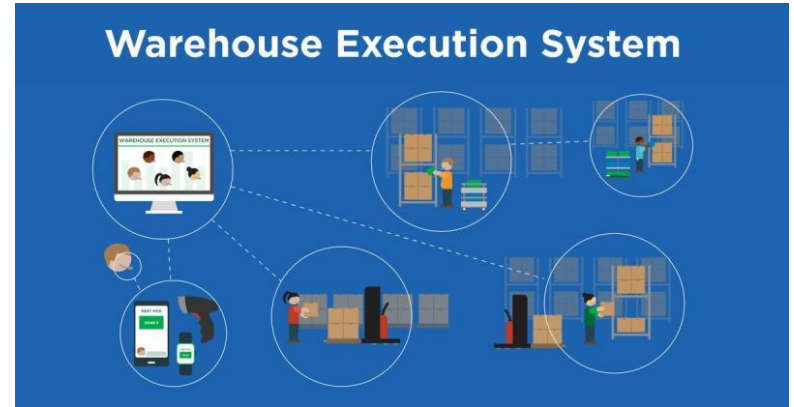
- Designed to interact with and control automation equipment
- This includes
 - *Conveyors*
 - *Sorters, etc.*
- Can communicate with another system
 - *WMS*
 - *ERP*
- Very machine-centric
- Limited to hardware control but essential for a working MHE implementation



IntraOne WES

Warehouse Execution System

- Focused on orchestration and optimization
- Balance warehouse
 - *From picking through shipping*
- Communications between systems
 - *Can be a bridge between systems*
- Employs higher-level decision making
 - *Loop sorters*
 - *Work distribution*
- Put wall management
 - *Include light control*
- Packing management
- Robotic management



IntraOne WMS

Warehouse Management System

- Sits in the center of a manufacturing and supply chain operation
- Manages raw materials, manufacturing, receiving, putaway, picking, etc.
- Order management
- Integration into ERPs
- Critical to ensuring the warehouse is operating as efficiently as possible



IntraOne TMS

Transportation Management System

Manages transportation systems for warehouses

- Includes trailer transportation
 - *LTL (less than truckload)*
 - *FTL (full truckload)*
- Parcel Carrier
 - *UPS*
 - *FedEx*
 - *USPS*
- Local carriers
 - *Dayton Freight*
- Rate shopping
- Trailer manifesting



IntraOne Software



FULL STACK

- WCS/WES/WMS/TMS
- Unified product
- Highly configurable
- **Mitigates risk, complexity, and long-term cost of ownership.**



HYBRID

- Supports both Cloud and “Edge” deployment models
- Fast and scalable
- Supports multi-site



ARCHITECTURE

- Modular architecture
- Microservice model
- Scalable and adaptable



CONNECT

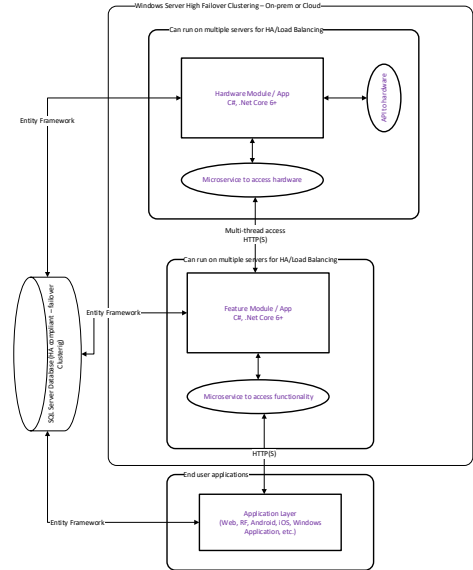
- Extensive integration API (including JSON)
- Connects endless technologies & systems together



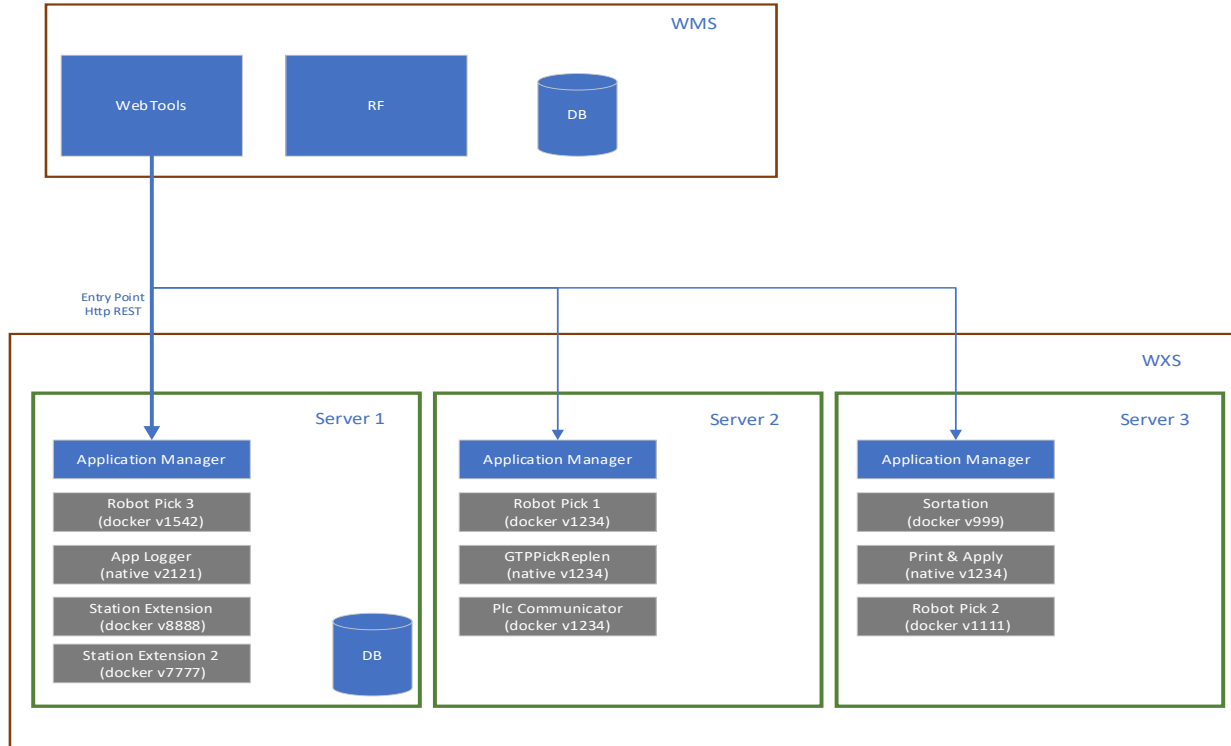
IntraOne Architecture

Started with our legacy WMS product

- Extending / building on the 40+ years of development work
- A more modular approach to the architecture
- Wanted to allow for true separation of concerns or layers
 - *Screens focus on user interaction and experience*
 - *Backend components have business logic*
 - *Machine-level integration separated from business logic*
- Use C# and React as primary development languages
 - *C# with Core 6 / .Net 4.8*
 - *React for UI development*
 - *Convert C++ applications to C#*
 - *.Net Maui for RF applications (future)*
- Entity Framework
 - *Event-driven database development (Table Dependency)*
- MQTT (discussed more later) for PLC communications



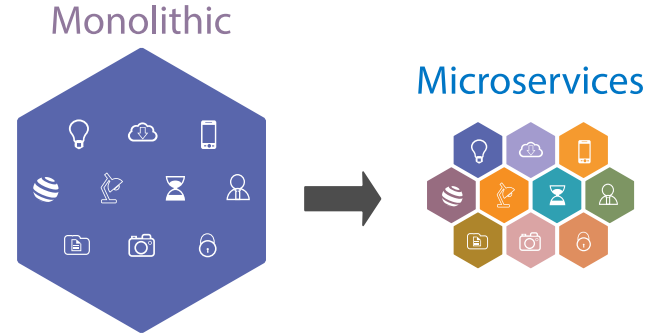
IntraOne Architecture



IntraOne Architecture

Backend

- Using **Microservices** to provide functionality
 - Each microservice is dedicated to a specific process
 - Microservices will communicate with each other via HTTP/HTTPS RESTful interfaces
 - Docker is used to install and handle versioning
 - *Can be installed natively as well*
- Example
 - Exotec integration
 - Low-level API is contained in a microservice
 - *It has no business-level logic – only how to communicate with Exotec*
 - Picking microservice has the business logic and, if configured to use GTP (Goods to Person), will determine through configuration which system to use and communicate to the microservice



IntraOne Architecture

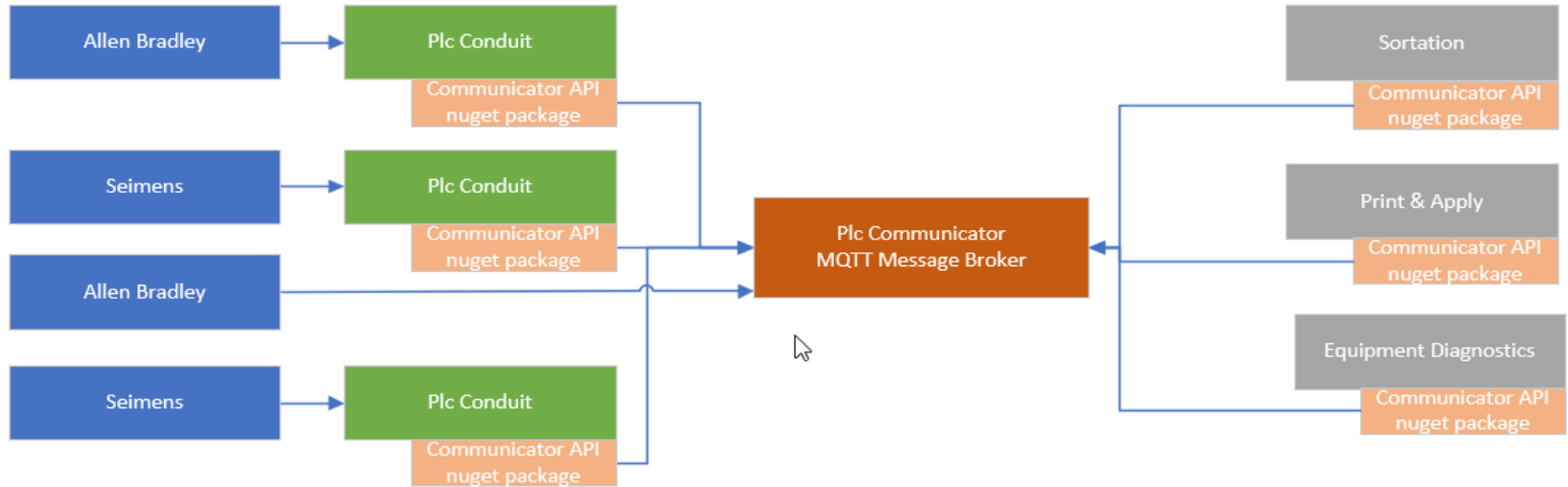
PLC Communications

- Like the rest of the system, the PLC communications are abstracted from the business logic
- Uses MQTT (*Message Queuing Telemetry Transport*) to communicate between II and PLCs
 - Adherence to IoT (*Internet of Things*) standard communications
 - Accommodates resource and network constraints
 - Ensures no messages are missed, even when the server is offline
 - Specifically designed for small, real-time updates between systems



IntraOne Architecture

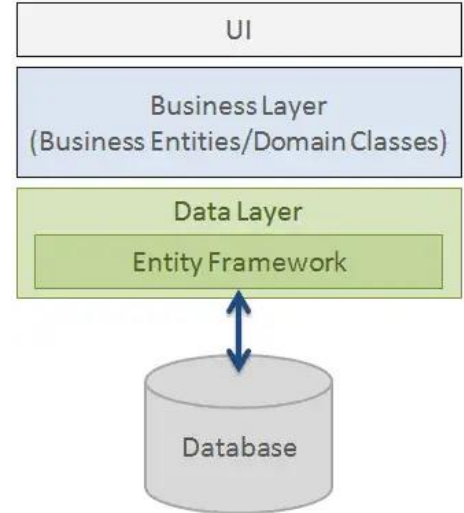
PLC Communications



IntraOne Database

IntraOne Database

- Built upon the legacy database
- Extending it where needed
- Replacing fixed sizes with more flexible options
- Accessing DB with Entity Framework
 - Allows for the database to become objects inside of the program
- Access to the database is limited to the containers (for applications)
 - Allows containers to manage its' own data
 - If anything is changed, the container is aware of the change and can modify behavior
- Some data is stored locally in memory within the containers
 - Data will be persisted as needed through periodic updates
- KPI tables
 - Key Performance Indicators
 - Faster / easier access



IntraOne Documentation

Documentation and help files

- New approach to documentation
 - Multiple ways to provide
 - Using new tools
- This includes knowledge base articles being updated
- New screenshots
- Better release notes
- Context-sensitive help (coming)





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