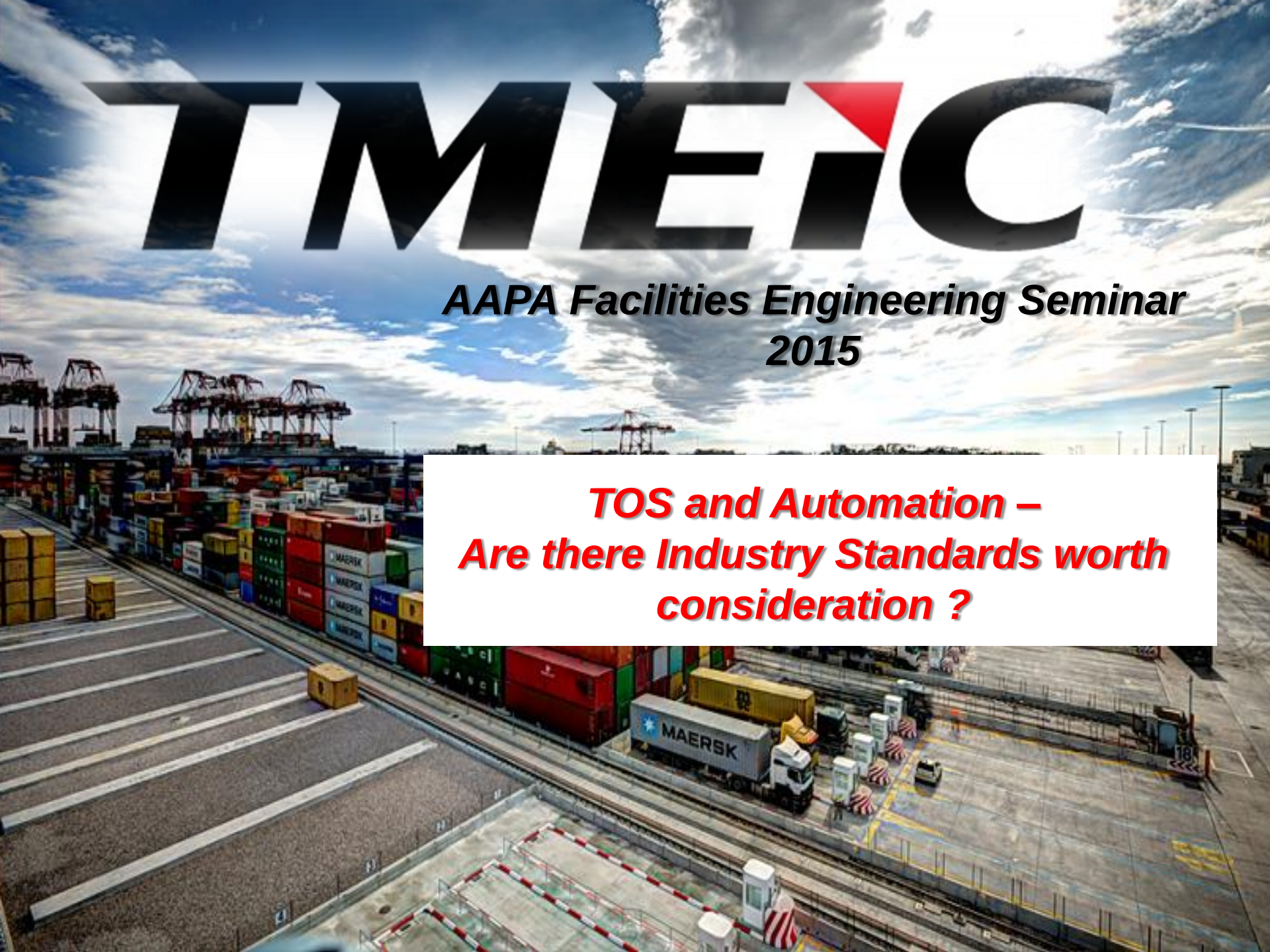
TMEIC

AAPA Facilities Engineering Seminar 2015

TOS and Automation – Are there Industry Standards worth consideration ?



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TOS and Automation – Are there Industry Standards worth consideration ?

Jim Gabbard,
Manager Automated Crane Systems
TMEIC Corp

Who is TMEIC?

TOSHIBA Leading Innovation >>>

MITSUBISHI ELECTRIC Changes for the Better

Industrial Corporation

TMEIC is a global drive and automation systems supplier with manufacturing, engineering, sales, and service facilities around the World.

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Early days – For centuries, freight was handled manually

1956 Houston

1961 '30'/40'

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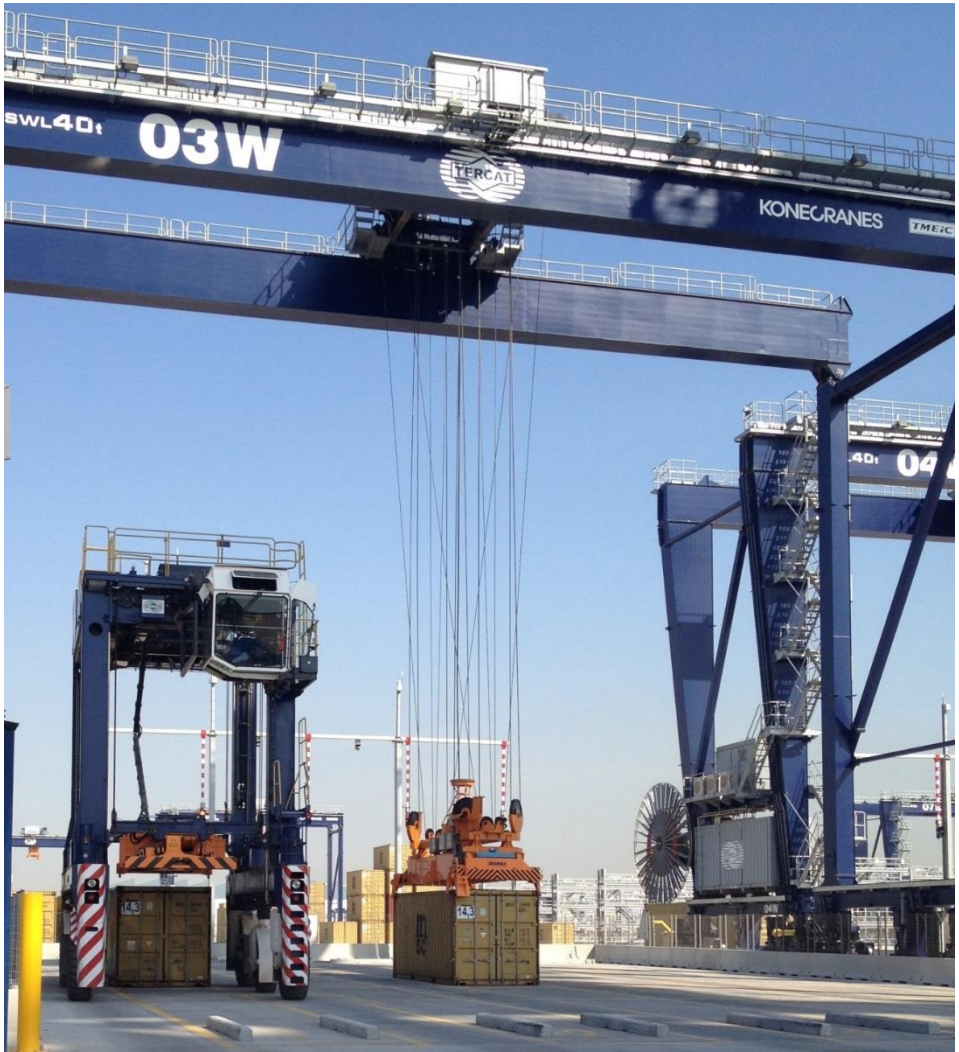
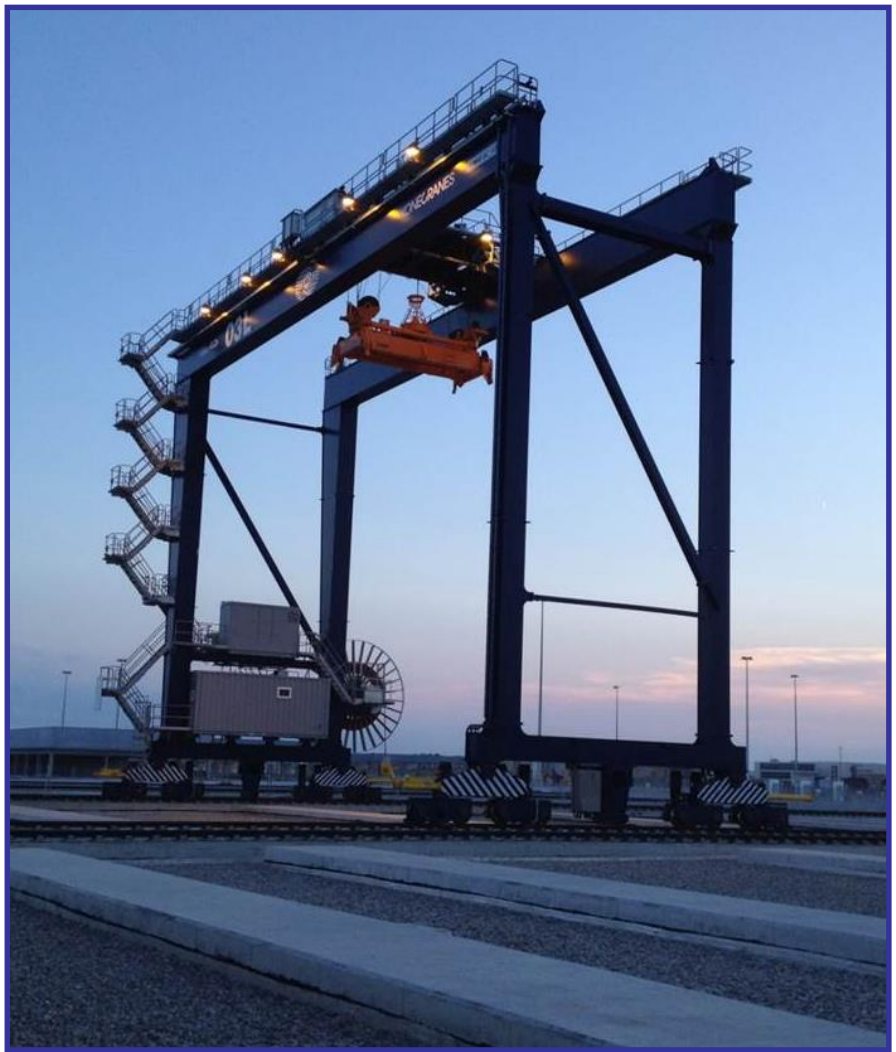
We find ourselves, once again, at the threshold of a new vision in terminal production, safety and cost savings





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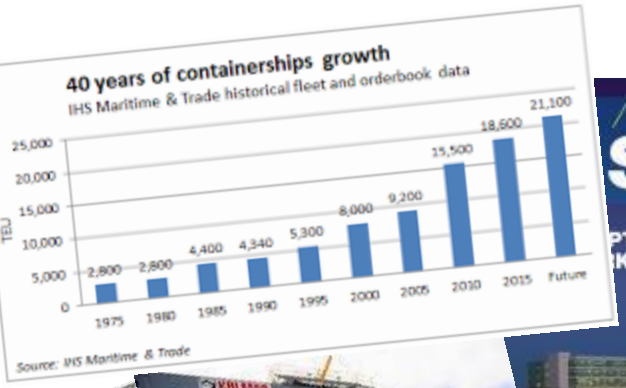
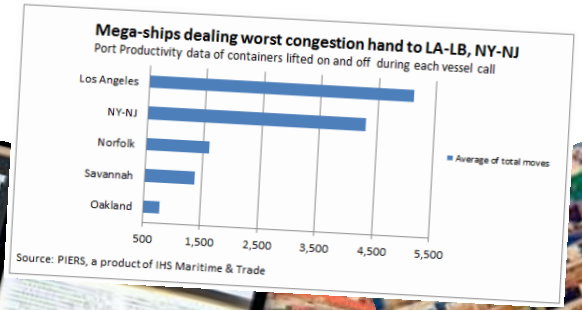
Pick up any Trade/Industry magazine and we see that Automation is here to stay





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LIEBHERR

PEPPERL+FUCHS

ABB

CONDUCTIX wampfler
© DELACHAUX GROUP

CAVOTEC

PEMA
PORT EQUIPMENT MANUFACTURERS ASSOCIATION

BROMMA

PINTSCH BUBENZER

Franz Wölfer
Elektromaschinenfabrik
Osnabrück GmbH®

navis®
PART OF CARGOTEC CORPORATION

RAM SPREADERS

SICK
Sensor Intelligence.

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KONECRANES®

SANY

APS Technology Group, Inc.
Automated Technologies With A Vision

PRYSMIAN
CABLES & SYSTEMS

ELME™
Swedish Spreader Systems

SIEMENS

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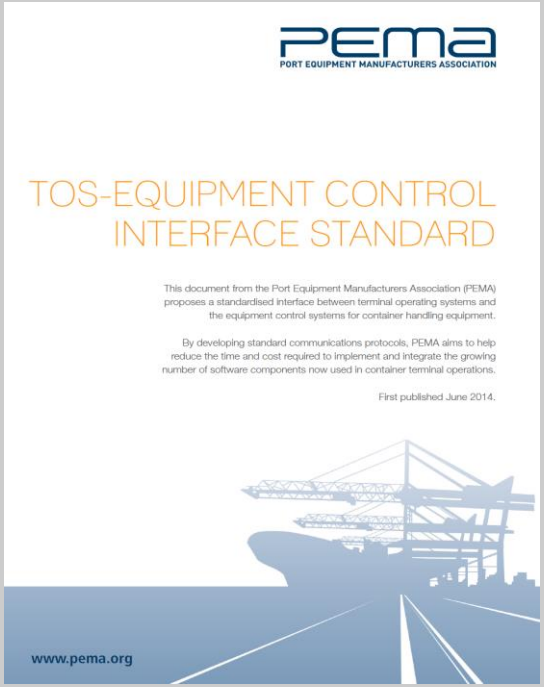
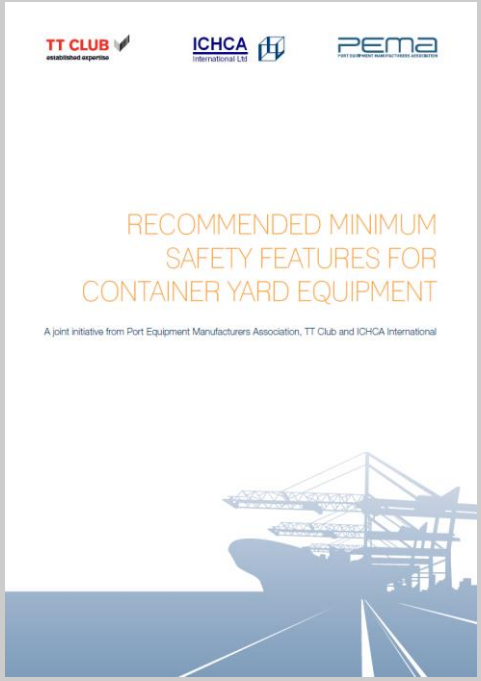
PEMA has taken a great new technology, and worked to provide terminals with a specific standard to help terminals enjoy the benefits of the complex task of

Video demos - PEMA leave stakeholders to produce some standards to simplify the process

AUTOMATION





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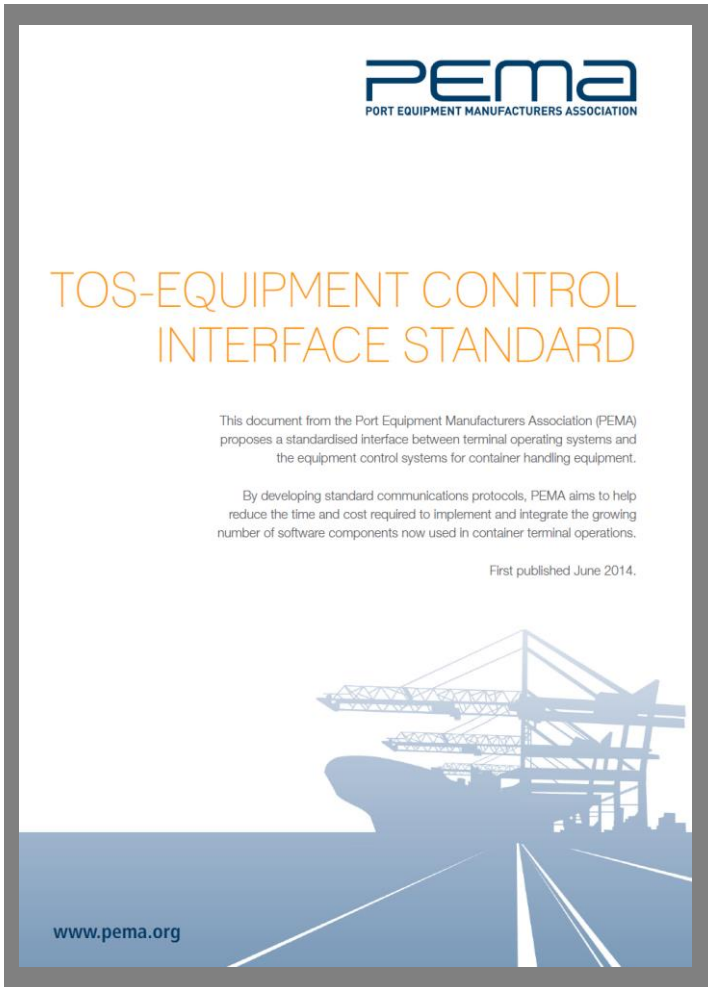
Today, I want to discuss the task of interfacing the TOS with the CHE and how TMEIC has utilized a proven technology to provide On-Time on Budget RESULTS



PEMA
PORT EQUIPMENT MANUFACTURERS ASSOCIATION

TOS-EQUIPMENT CONTROL INTERFACE STANDARD

This document from the Port Equipment Manufacturers Association (PEMA) proposes a standardised interface between terminal operating systems and the equipment control systems for container handling equipment.

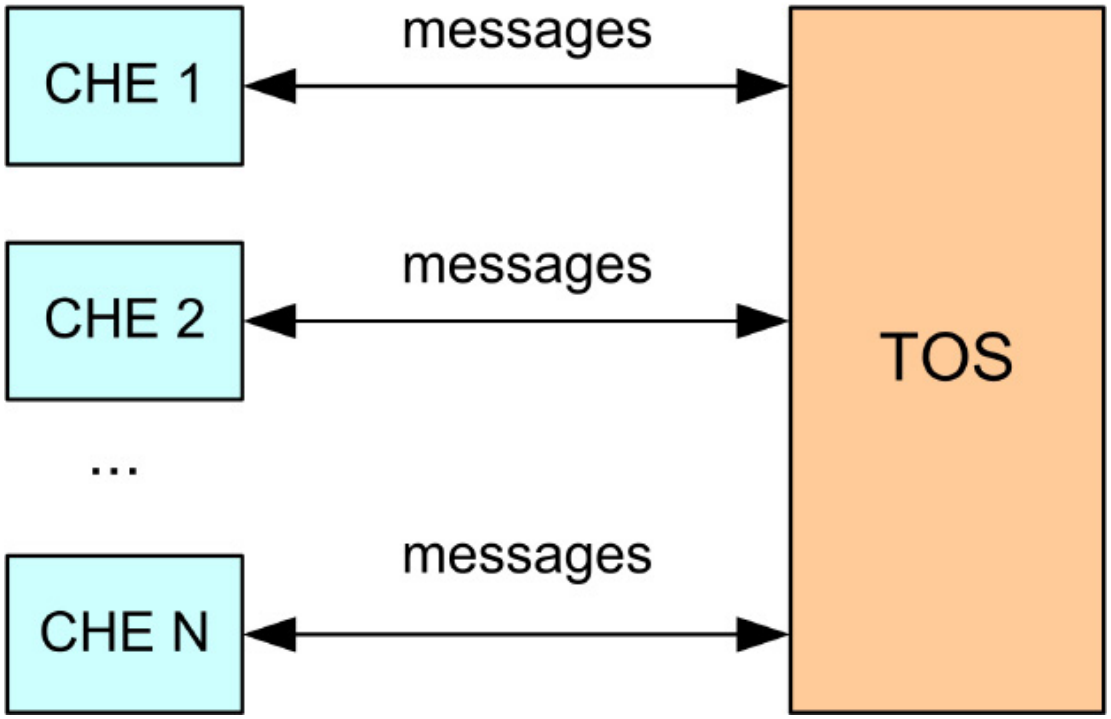
By developing standard communications protocols, PEMA aims to help reduce the time and cost required to implement and integrate the growing number of software components now used in container terminal operations.

First published June 2014.

www.pema.org

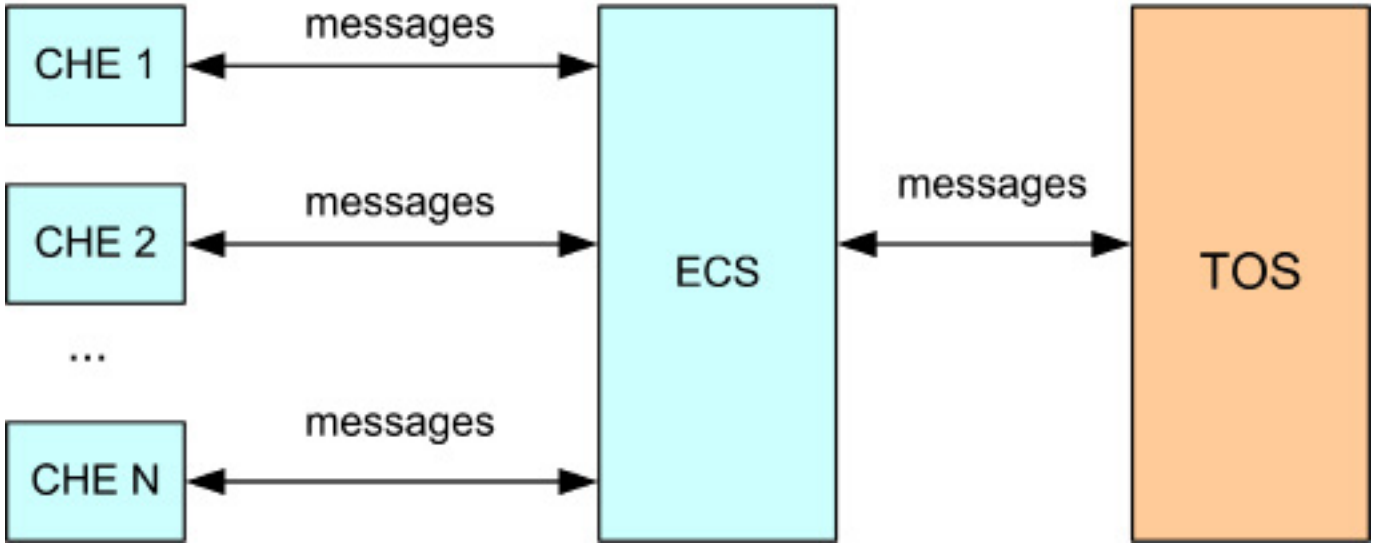
PEMA reminds us that there are three primary ways to interface the TOS (Communication Architectures)

First is through direct connection between TOS - CHE

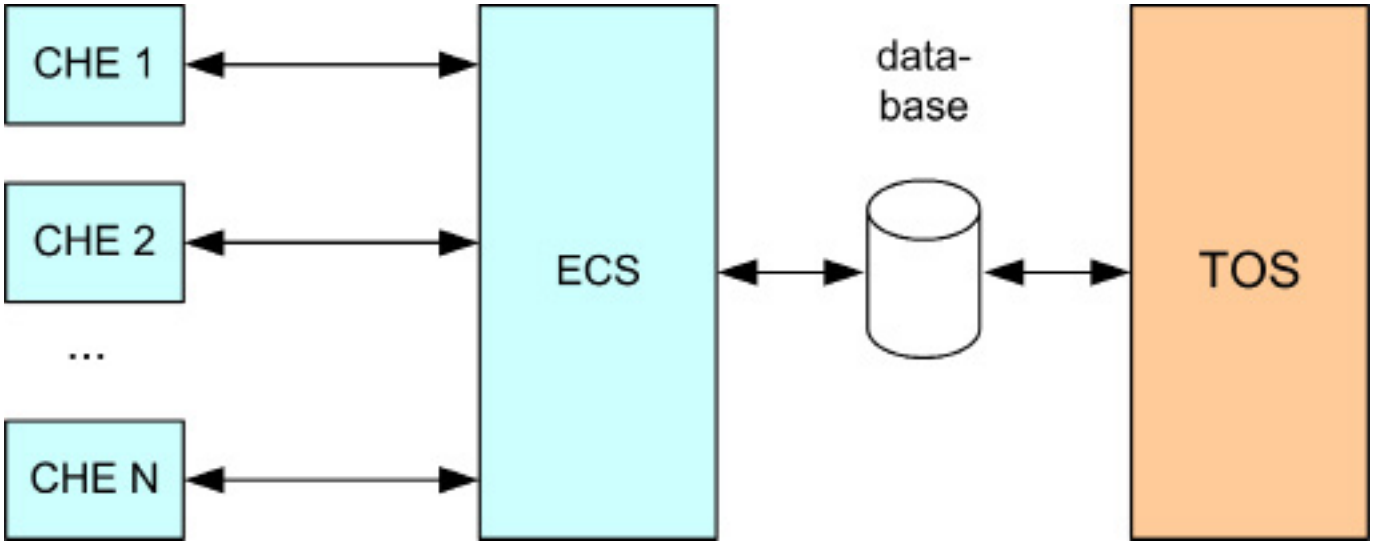


Second is through a CHE fleet server

A different arrangement with clearer communication, but still relies on a software (middleware) for the TOS to direct the CHE in yard



This method was tested successfully on several CHE through project-based server. allowed TMEIC to provide our customers with successful start-up communication between TOS - CHE the first time it is tried.



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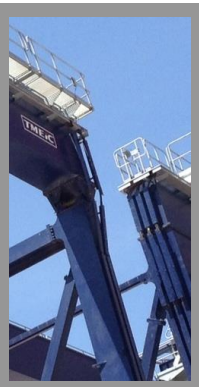
So…

How does TMEIC do this?

Crane Automation Systems

TOS Interface Overview



Back in the early days…

TOS Development Team

Speaking Different Languages

Crane Automation Development Team

Back in the early days…

TOS Development Team

TASK: “Go pickup container ABC”

Code: “//Go_pickup\\bigyellowbox**%abc”

“OK… let us work on that.”

“We will write special code into our system to accept your code”

“//Go_pickup\\bigyellowbox**%abc”

Crane Automation Development Team

Back in the early days…

TOS Development Team

TASK: “We need to change something a little bit…”

Code: “//Go_pickup\\bigBLUEbox**%abc”

“OK… let us work on that.”

“We will rewrite our special code into our system”

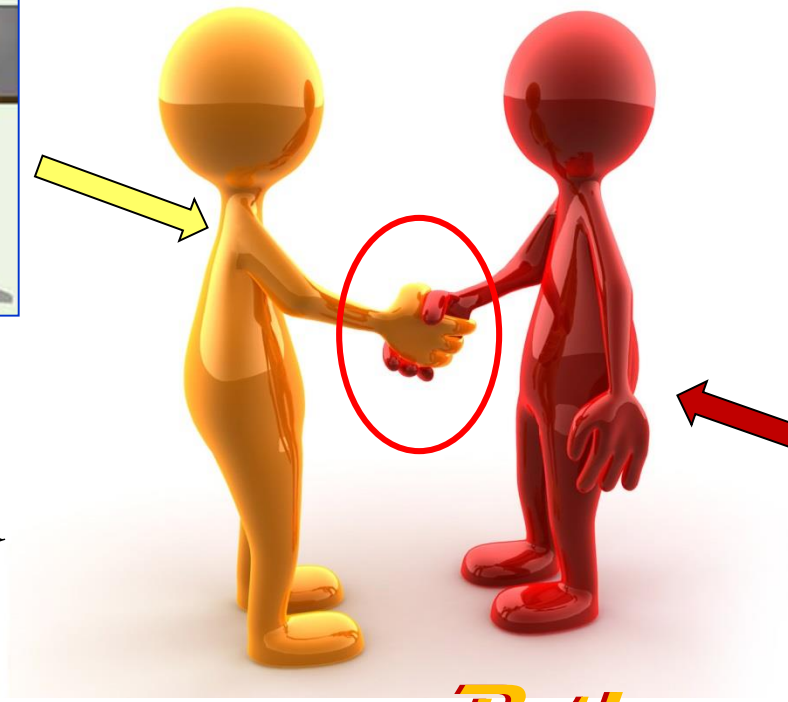
“//Go_pickup\\bigBLUbox**%abc”

Crane Automation Development Team

Back in the early days…

TOS Development Team

Wastes Time



Complex

Crane Automation Development Team

Both Teams Must Play

What should we expect from a good TOS Interface?

- Simple
- Easy to adapt to any TOS system
- Expected to work the very first time you turn it on.
- Easy to use at the terminal engineering talent level.
- Easy to trouble shoot and manage after start up.
- Scalable
- NO ‘BLACK BOXES’

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TOS Development Team

Crane Automation Development Team

Status Table	
CHE_ID	ID of ASC
ONLINE_STATUS	Status of ASC
WORK_STATUS	Work status of ASC
TO_GKEY	Transport order being executed
CQ_GKEY	Command being executed
LOC_BLOCK	Current Block of ASC
LOC_BAY	Current Bay of ASC
CONTAINER_1	Current Container 1
CONTAINER_2	Current Container 2
SEQUENCE_STATUS	Additional status info.
. . .	

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TOS Development Team

Crane Automation Development Team

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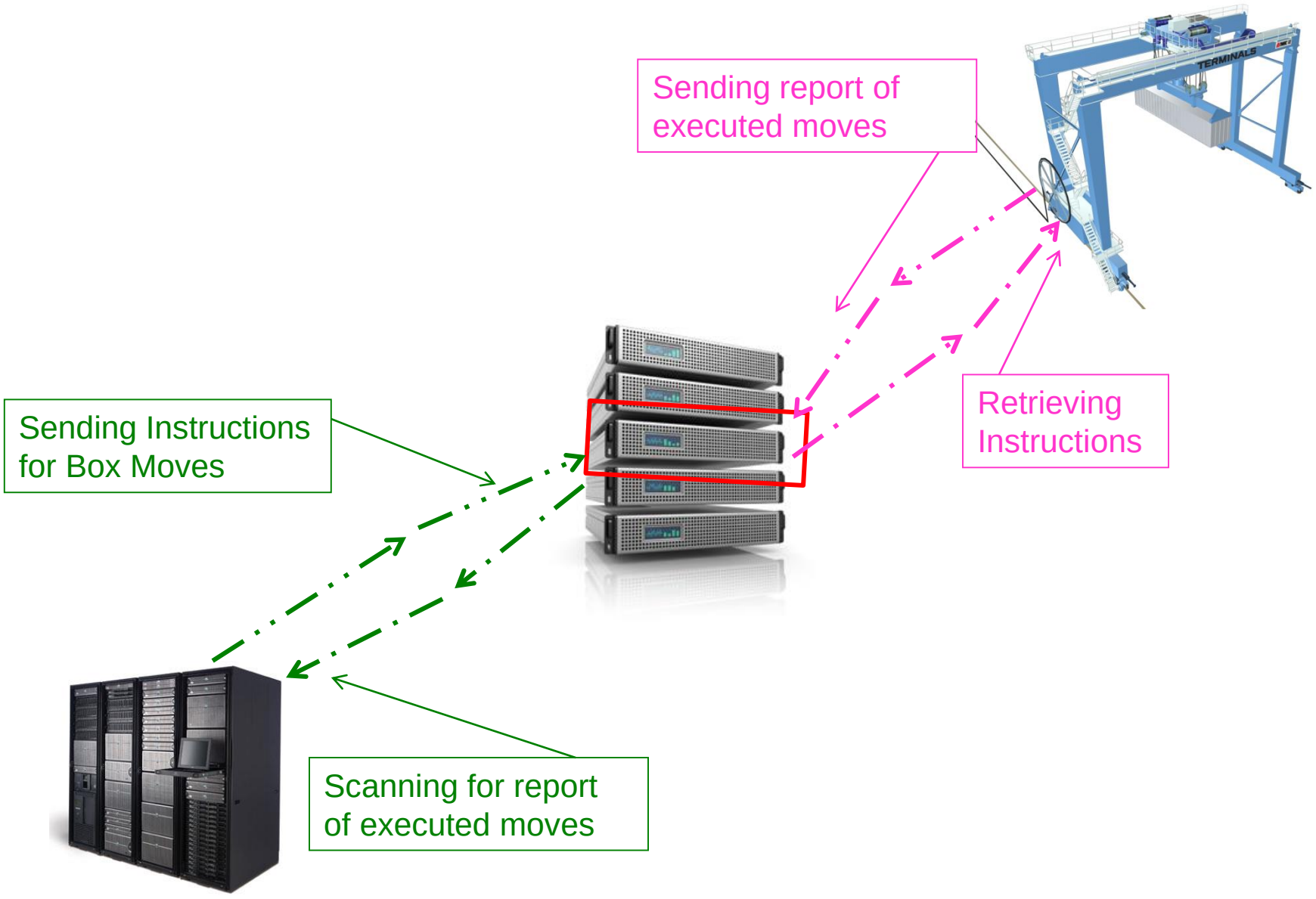

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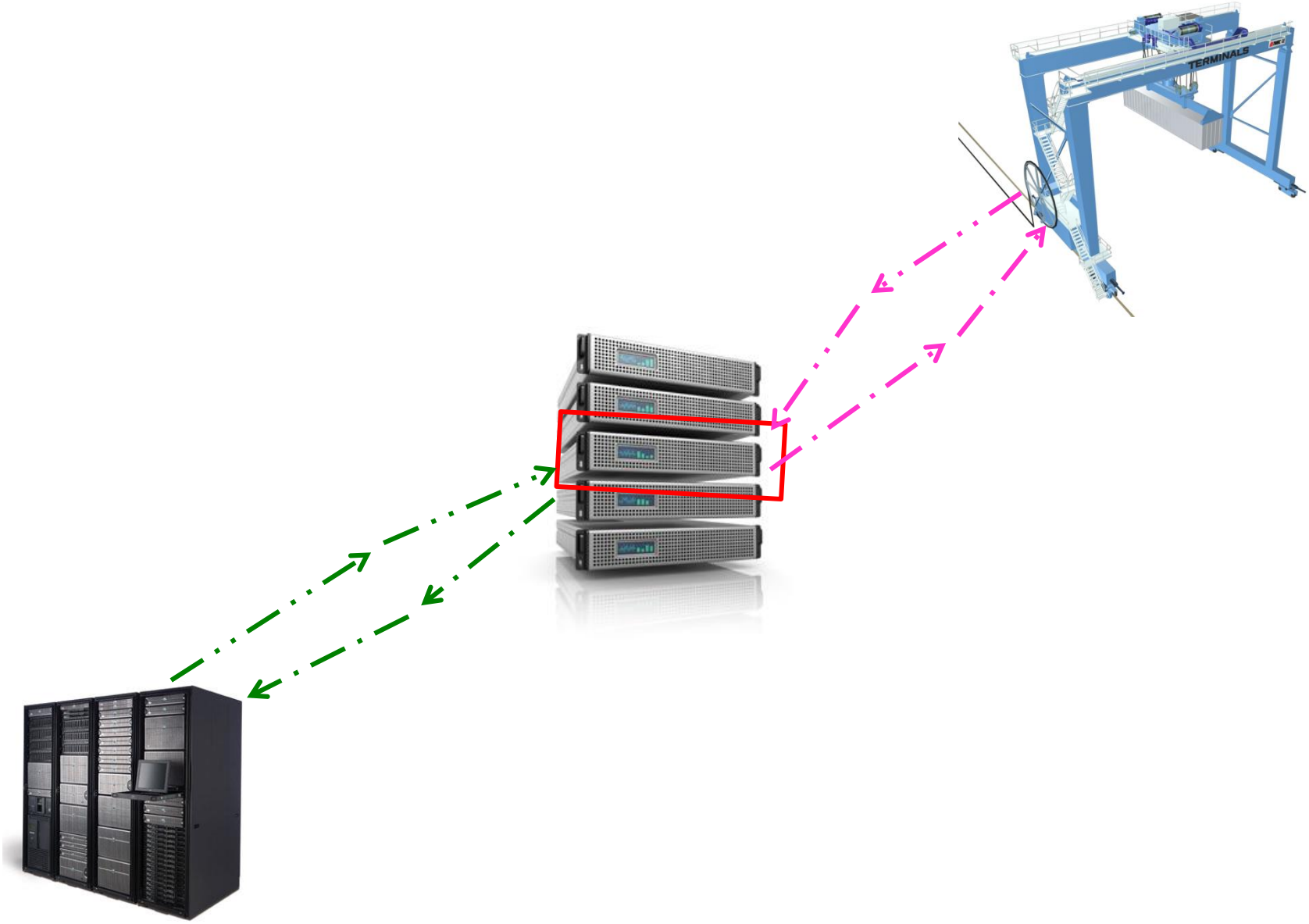

How does this work in Terminal Automation ?

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TOS

- *TMEIC can work with any TOS*

TOS

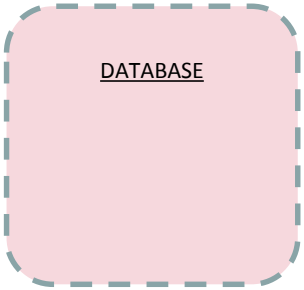
Responsible for the tracking/inventory of all containers

- *Proven method of interface data transfer*

Responsible for tracking position of CHE

Generates work orders that the CHE performs.

- *Works the first time… every time.*

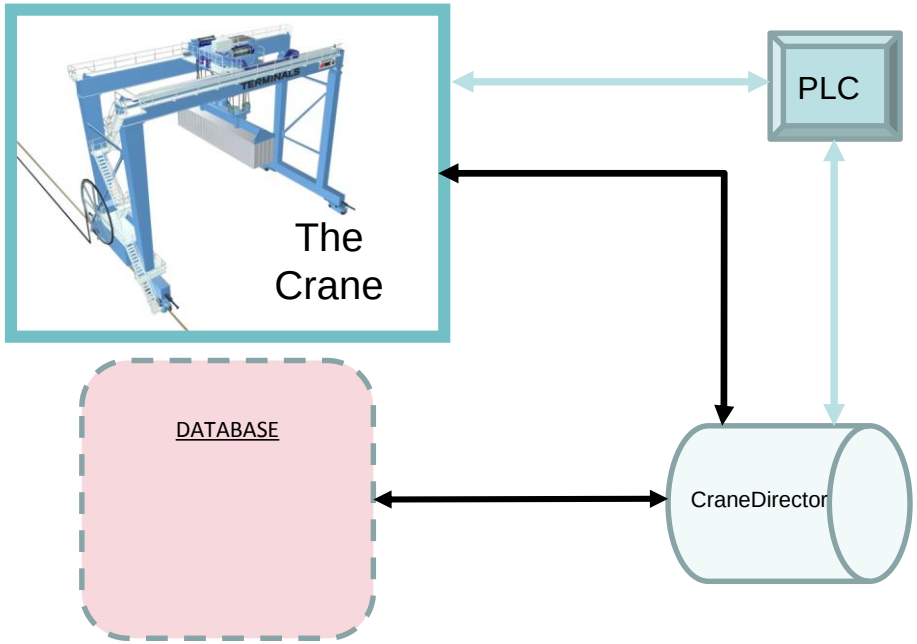


The database can reside on any SQL Server

Accessible by the TOS and CHE automation systems

Both systems have Read permission for all tables.

Both systems have a group of tables that they alone can write data to.



This crane computer is called the CraneDirector™.

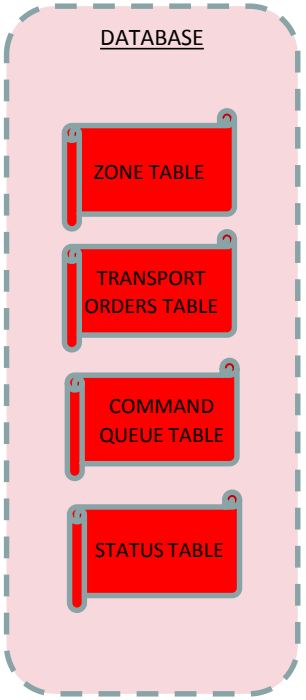
It communicates between the crane and the database

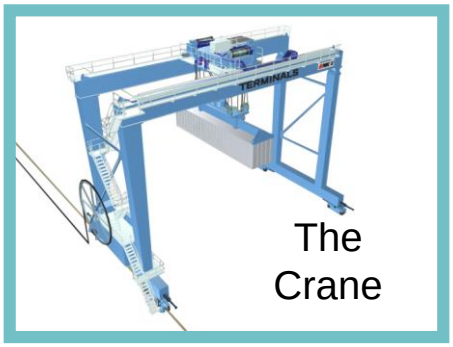
The CraneDirector™ monitors and reports the status of the crane

CraneDirector™ updates the appropriate tables in the database.

CraneDirector and Crane's PLC communicate via Ethernet

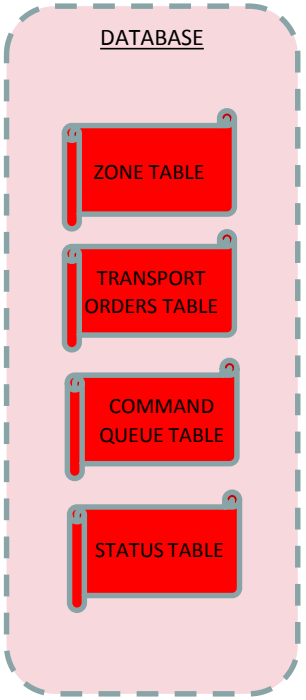
The TOS Interface

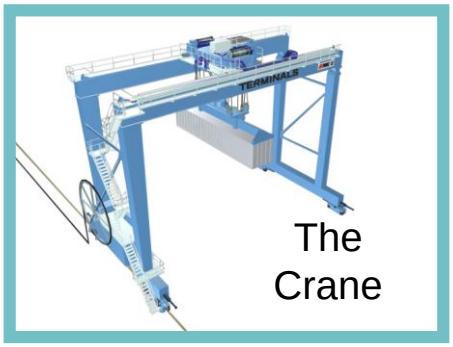




The TOS Interface

TOS generates instruction to be executed

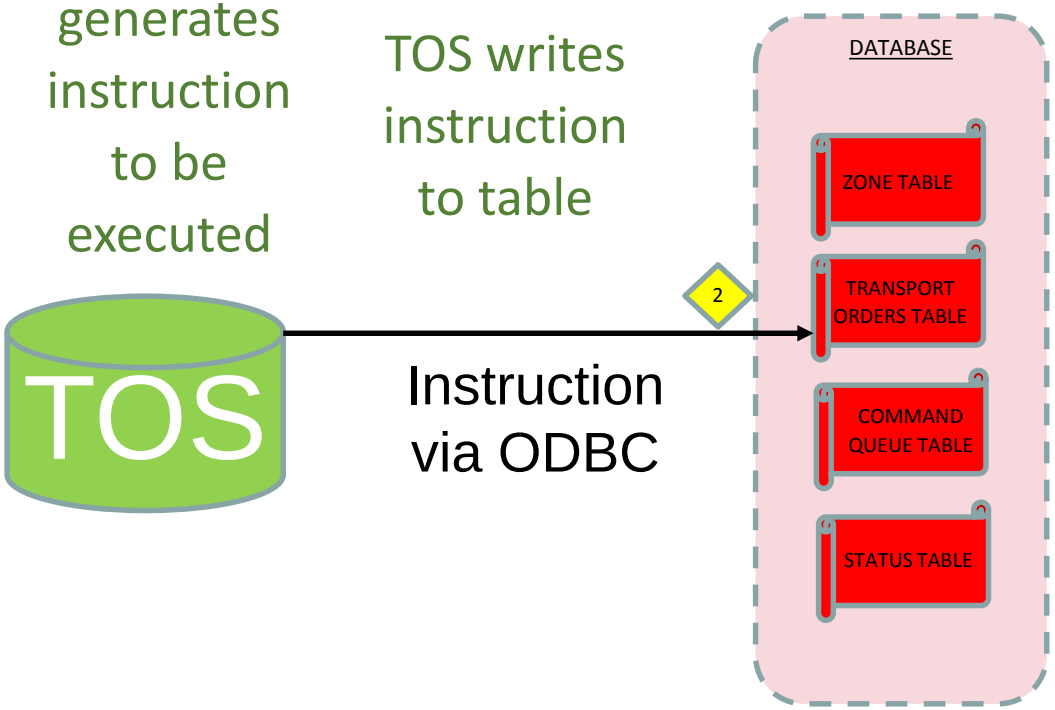


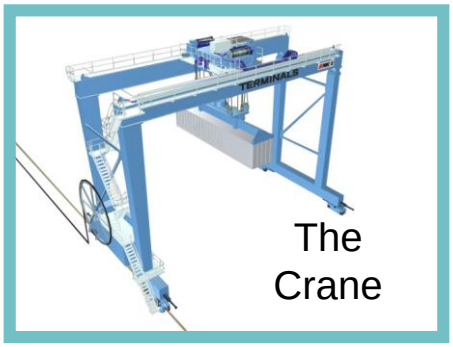


The TOS Interface

TOS generates instruction to be executed

TOS writes instruction to table





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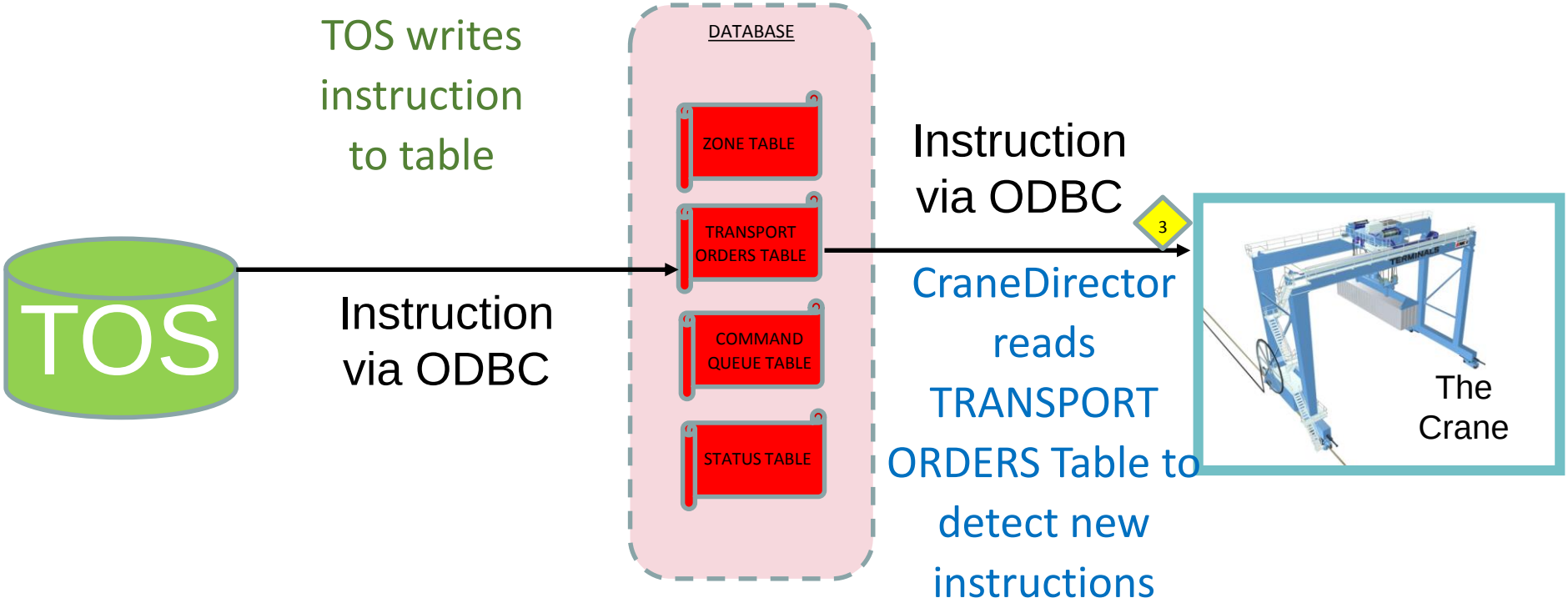


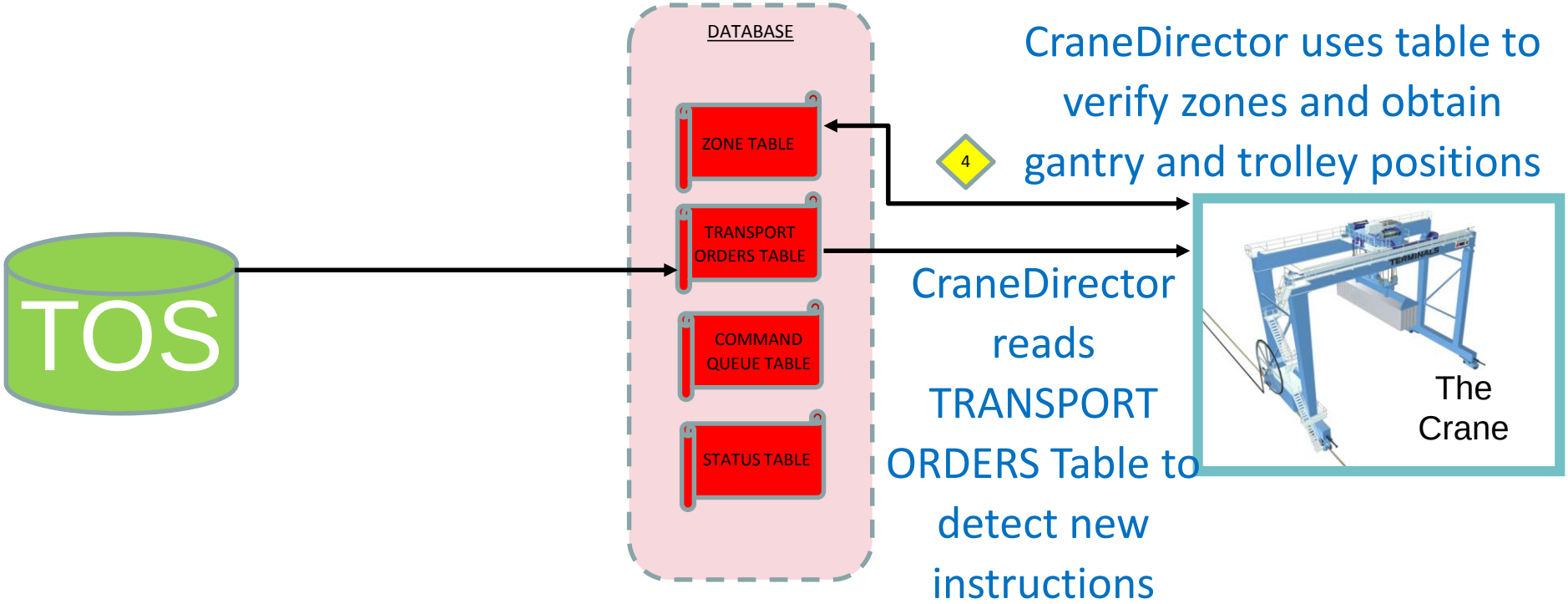
So… What is ODBC?

ODBC

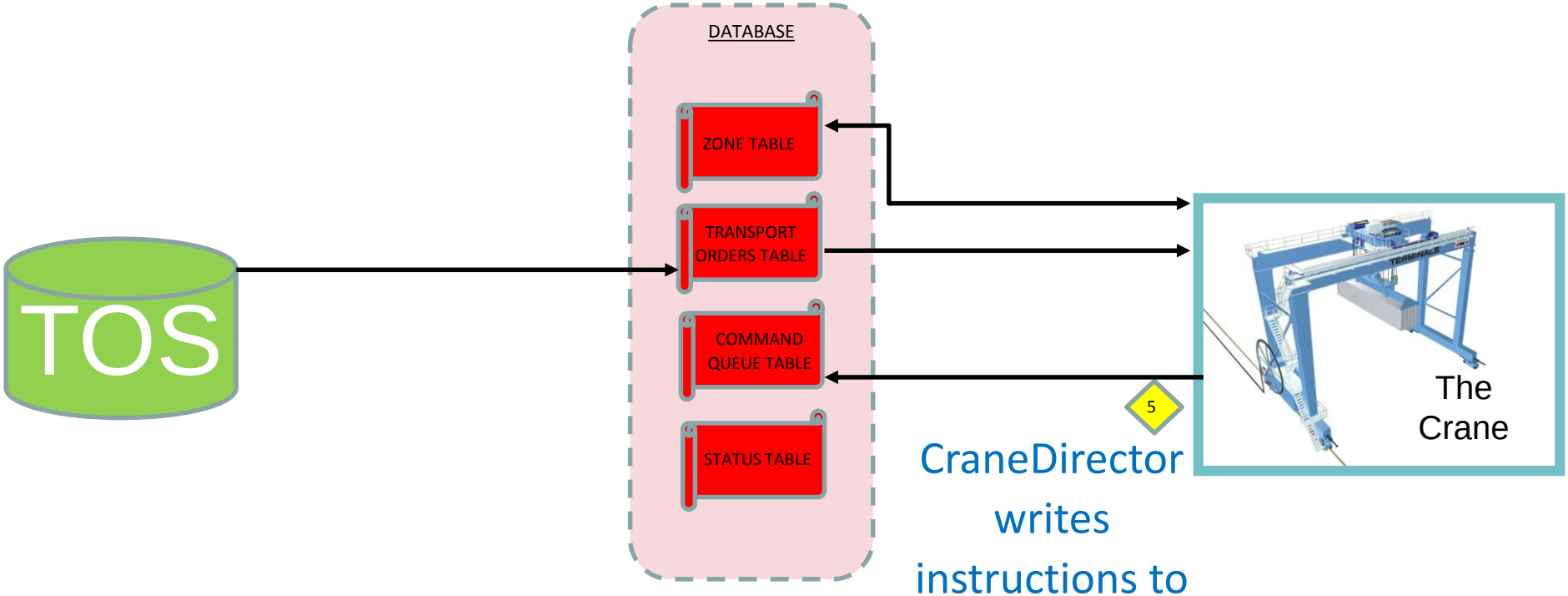
Open Data Base Connectivity

- Microsoft Communication Protocol
- Developed in the early 90’s
- Easy to use and adapt
- Allows data base platforms to communicate and share information easily

The TOS Interface

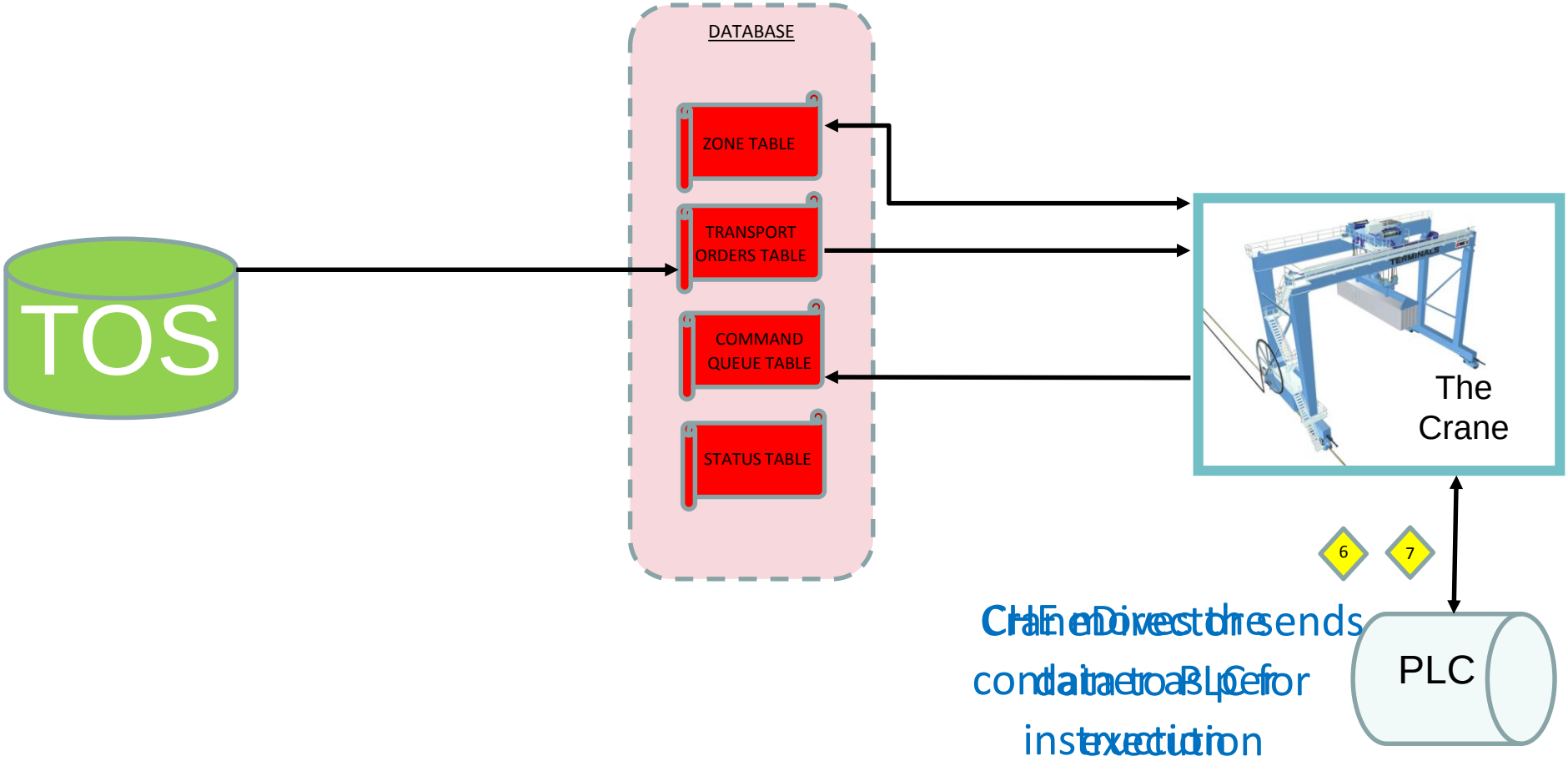


The TOS Interface



CraneDirector writes instructions to the COMMAND QUEUE Table

The TOS Interface



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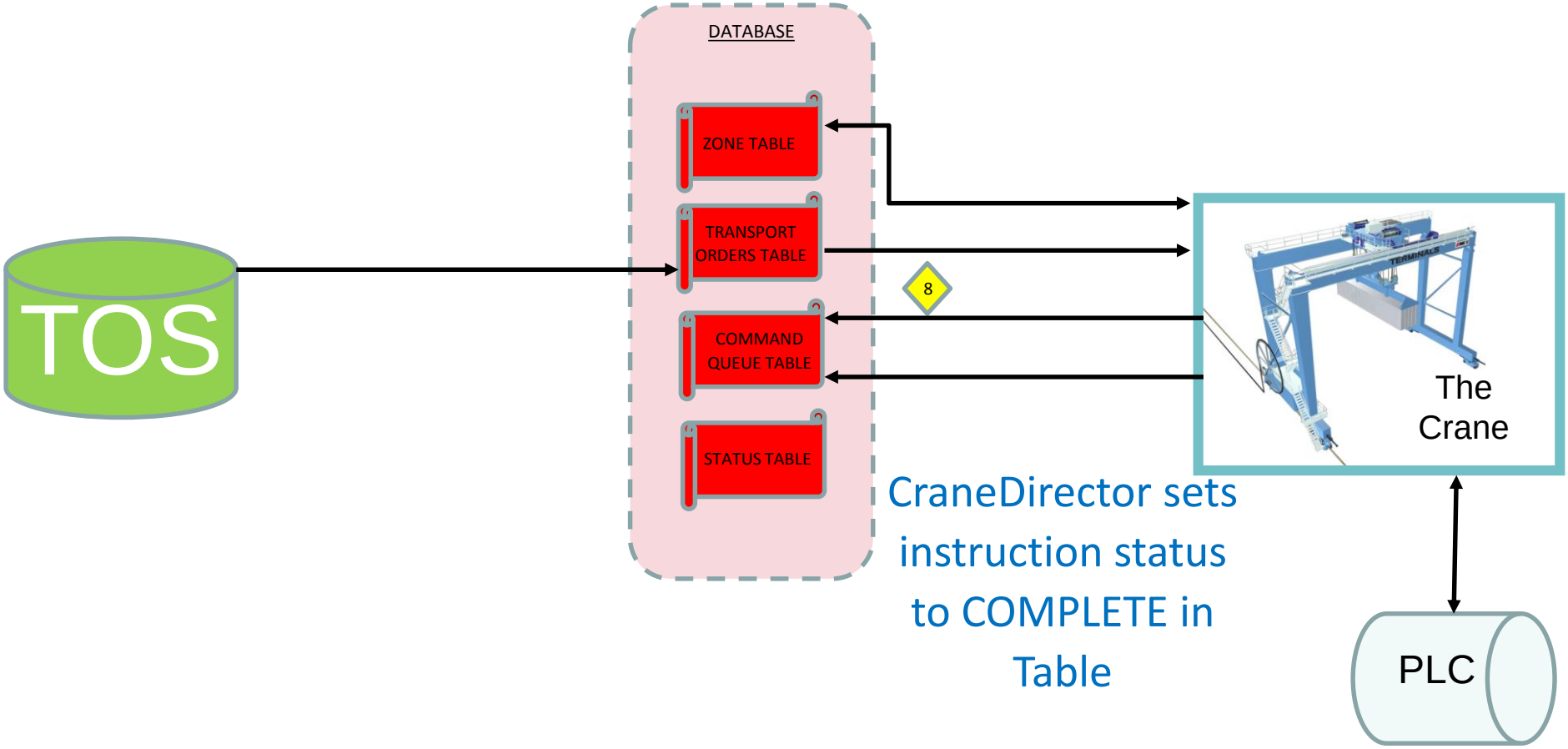
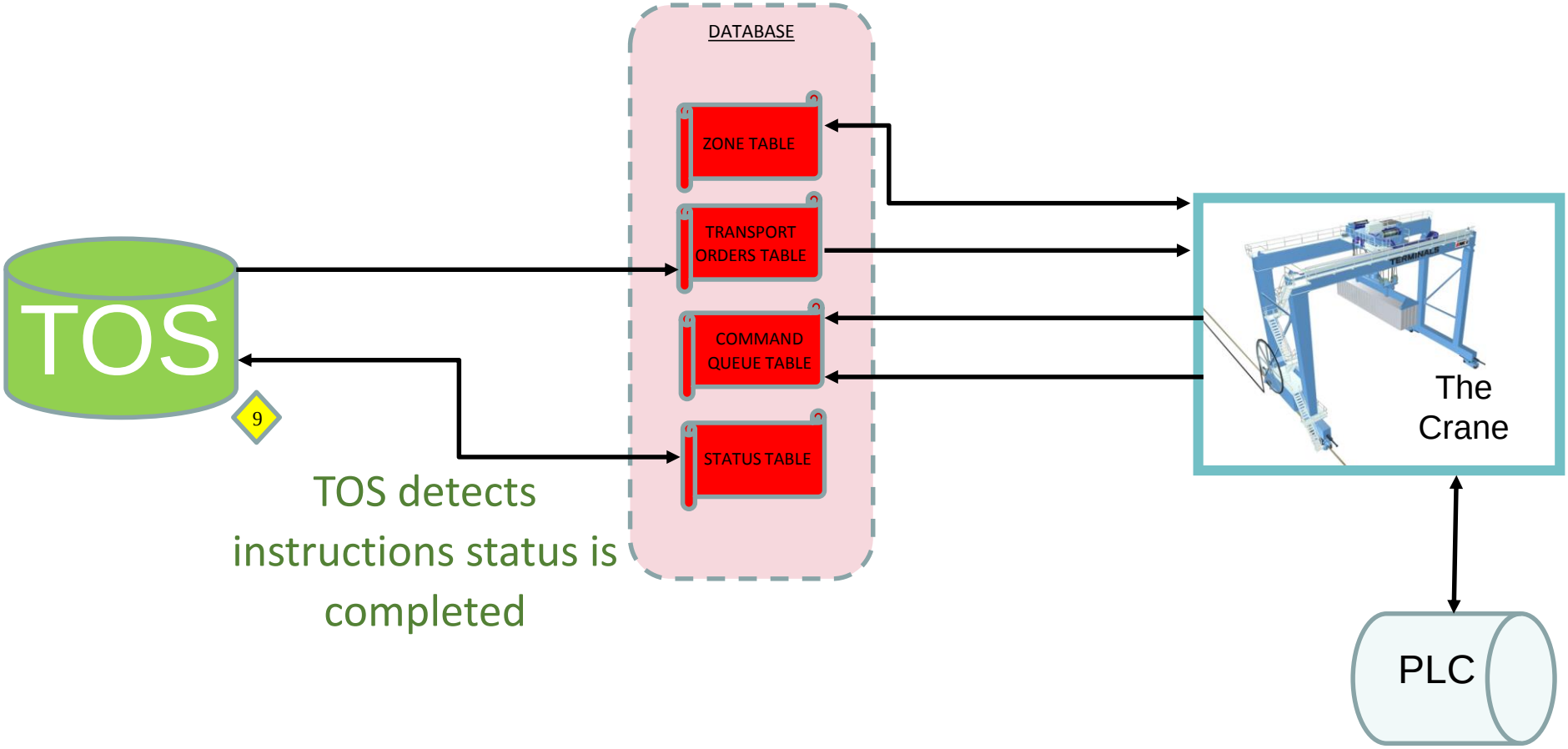


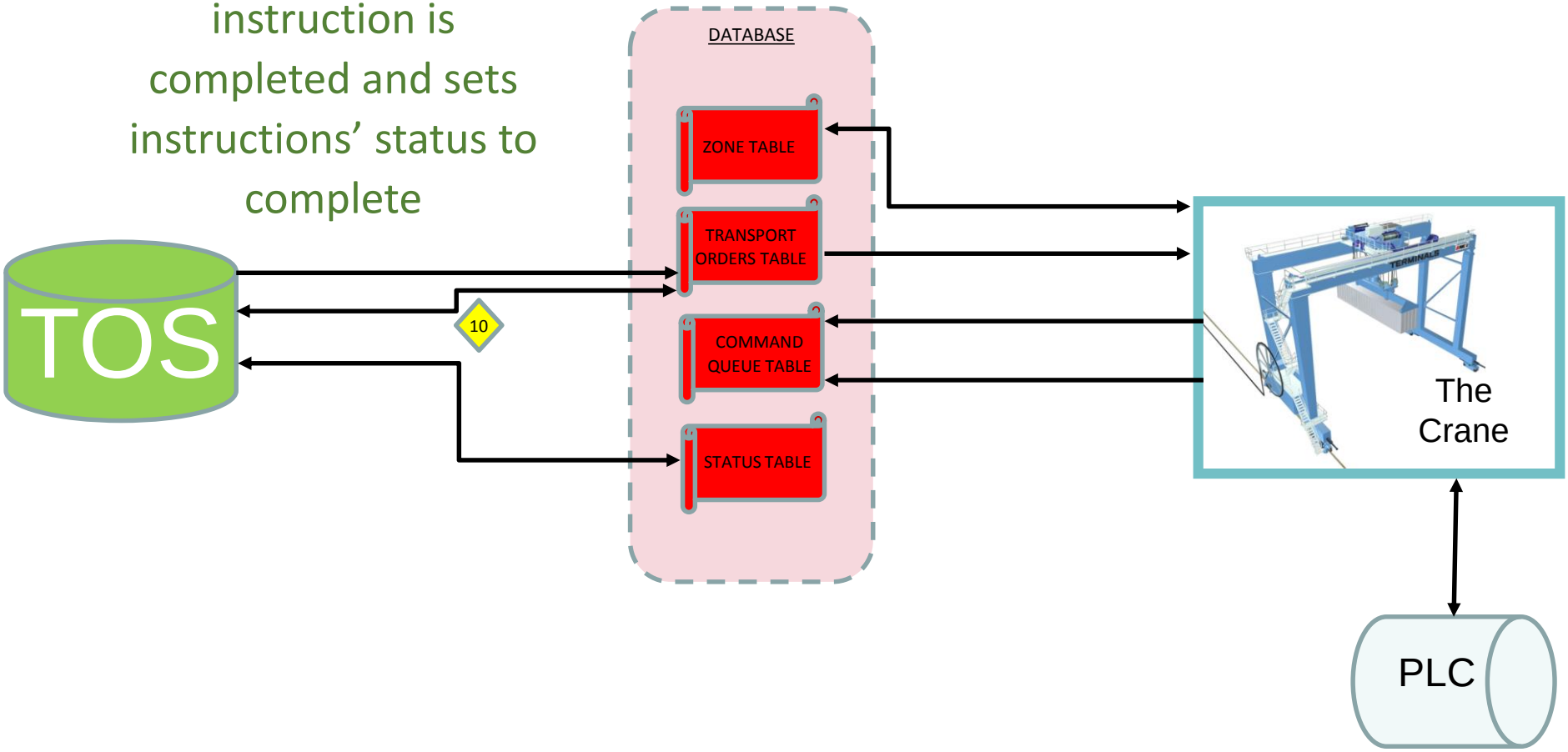
CraneDirector sets instruction status to COMPLETE in Table

The TOS Interface



The TOS Interface

TOS confirms instruction is completed and sets instructions' status to complete



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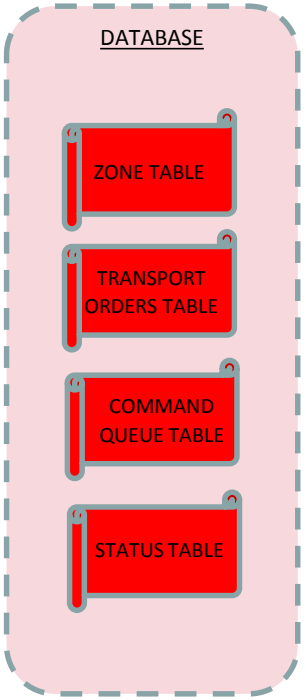

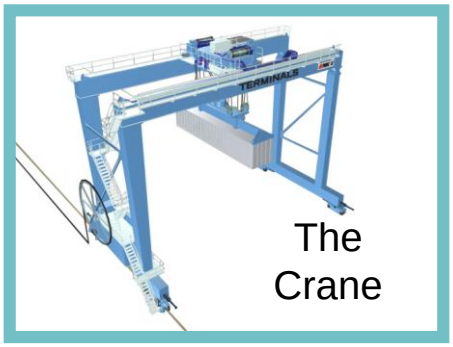

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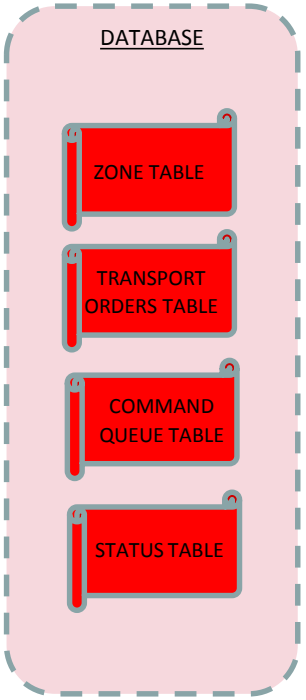

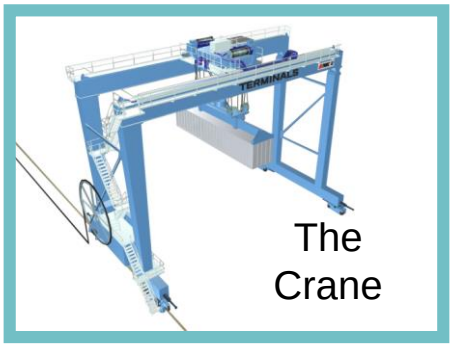

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In 2007…

"TMEIC saved Navis 20,000 hours of start-up commissioning time by insisting on doing the TOS Interface their way."

Eric Klein
Navis Project Manager
APMT Virginia 2007

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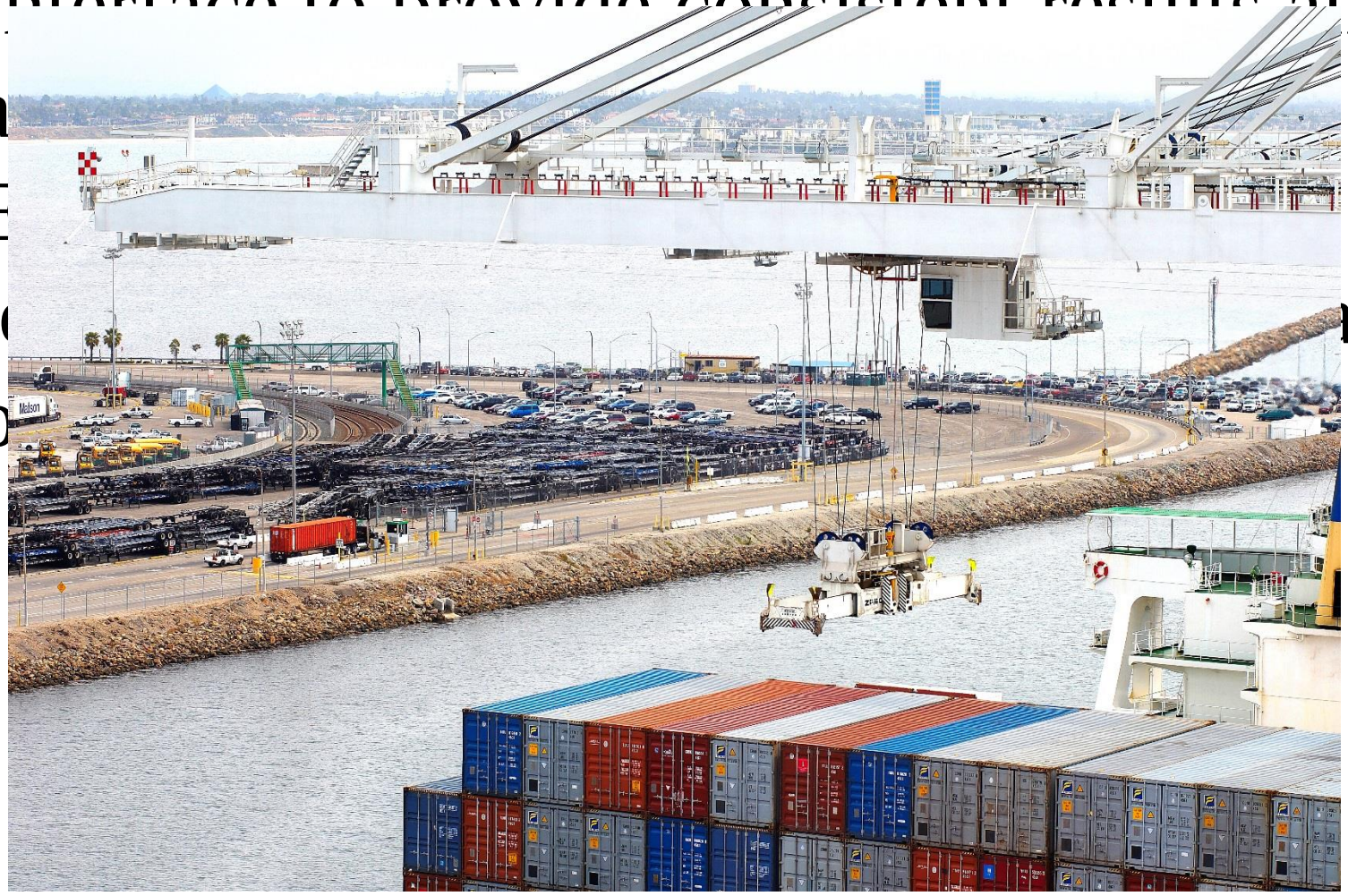
Manage their Operations in the most cost effective way possible

Automate Operations in the most efficient and safe

Terminal Operating System (TOS) offers the Interface to provide consistent results and a



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Since the earliest days of containerization…

There have been a lot of major changes in the way we do business. Standardization will allow us to work effectively and utilize the best that technology has to offer.

Since 2007…

Multiple Successful Terminal Automation Projects

On Time… & On Budget

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GLOBAL CONTAINER TERMINALS USA

SICTL Sydney International Container Terminals

BEST

TMEIC

ADPC
شركة أبوظبي للموانئ

BCT Brisbane Container Terminals

THE PORT OF VIRGINIA

Around the world, we continue to provide
Automated Terminal Projects

ON TIME & ON BUDGET

TMEIC

Delivering Customer Success,
Every Project,
Every Time . . .