## **TWENTY THIRD ANNUAL**

May 1 - 4, 2022

**TestConX** 

DoubleTree by Hilton Mesa, Arizona ACCINE

© 2022 TestConX– Image: f11-photographer / iStock

**Operations 1** 

# Nx-Lab: The Next Generation Test Floor Management System

Ooi, Seong Guan (SG) Lee, Daryl Wei Zhung



Mesa, Arizona • May 1– 4, 2022

intel

TestConX Workshop

www.testconx.org

May 1-4, 2022

**Operations 1** 

#### TestConX 2022

## Content

- Introduction to SEMI E10 for OEE Optimization
- Challenges & Current Design Limitation
- Innovation Objectives
- Solution Overview
- Business Impact & Summary
- Acknowledgements



Nx-Lab: The Next Generation Test Floor Management System

2

Operations 1

## Introduction to SEMI E10 for OEE Optimization

- SEMI E10 Specification for Definition and Measurement of Equipment Reliability, Availability and Maintainability (RAM)
- Support Multi-path Cluster Tools
- 6 basic equipment states with aggregations
- Importance of SEMI E10:
  - Uniform common language for equipment users and suppliers to analyze equipment performance and identify improvement opportunities
  - Basis to establish equipment performance requirements during purchase and service negotiations, followed by continuous improvements in equipment design and support
  - Baseline for capacity analysis, constraint management & cost of ownerships
  - Correlated to SEMI E79, SEMI E35 & SEMI E124 implication and standards



#### TestConX 2022

Operations 1



#### TestConX 2022

**Operations 1** 



TestConX Workshop

www.testconx.org

May 1-4, 2022

#### TestConX 2022

**Operations 1** 



#### **TestConX 2022**

**Operations 1** 

## **Innovation Objectives**

- 1. Simplify the Multi-path Cluster Tools "add-on process"
- 2. Create a transparent, common & plug and play utilization tracking methodology to support integration of various type of equipment
- 3. Enhance data collection for equipment uptime with more details
- 4. Enhance data visualization layer for more insights
- 5. Direct user interaction with equipment One Stop Solution



#### TestConX 2022

**Operations 1** 



## **Feature #1: Instant Equipment Clustering**

	lame "		Farm "	Farm "					
Enter A	System Name		Please Select One	Please Select One					
Access T	ype *	Status *							
	~		~						
Tag ( Pres	s `Enter` to save a	tag without # )							
Enter A	System Tag								
Collatera	ls *		Additional Info	ormation					
Туре	Name	Details	+ Field	Value	+				
Pleas 🔻	Please Sel 🔻	OS:	X						
		PCH:							
		CPU:							
		MAC Address :							

GUI for user to define equipment clustering. Different equipment type can be cluster into a single system on the fly

Test**ConX**®



Clustered equipment are shown under 1 single system. User can access to the equipment directly by clicking the "play button"

Nx-Lab: The Next Generation Test Floor Management System

Home > Configuration > System



Session 3 Presentation 3

**Operations 1** 



#### TestConX 2022

**Operations 1** 

#### Feature #3: Process Level Tracking

Dashboard												2.2	Screens	Screens · Edit scree	
Favourite maps		Last 20 issu	es						100.00	Status of Zabbix			All screens J. Zablos server		
Local network		H037	i∋iMi∈		LAST DA	NGE /	(E)   N	FO AD	ACTIONS	PARAMETER	VALUE	363413	78	ler •	
	Маря	Neshor	CPU load too na hoed for two min	h on these	2016-02-3 08:50:19	2 2	25	50	+	Zabitie server is running	9463	localhest 10051	2011 (1122) (1122)		
Favourite graphs		Nes host	New nost nas ju remarked	theer.	1016-02-1 00:47:59	2 2	m 42s	NO	1	Number of hosts (enabled/disabled /demptates)	м	3871743	a 4 Zabbix server 1: CPU load (1h)	New hast: CPU load (1h)	
	Graphs	Zottos sense 1	Contra person 3 residented	us jue term	2016-02-1 08-45-21	2 4	0.204	50	304	Mumber of terms (enabledbloabledbod supported)	256	3527074	HARAMore March	13 saph and a	
Favourite screens		Zanha unner 1	Lacs of this available on the lace	ROADE OR	2815-08-3 39 29:19	4 8 3 444	en 44 De	Ves hown Ups	* . NATIONAL (11)	Number of Inggers (enabled/disabled (problem/ck))	95	94/1 (#/90)		N I I I I	
Scheme Side show	Stide shows	Sustem stat								Number of users (online)	3	2	B B last w	Z.	
		HOST SROUP	DISASTR	45.4		ARVING	A-CENAR		T CLASSIFIED	Required server			Processor load (1 min average per core) [avg] 0.38 ( Processor load (5 min average per core) [avg] 0.15 0.	Processor load (1 min everage per core) [evg] Processor load (5 min everage per core) [evg]	
		Clouds								persecond	4.79		Processor load (15 mm average per core) [avg] 0.1 0. Dested hore: Nore:	Destroy the second to the second per core)	
		Database serve					n					Updatest. 00:56-40	Table searce 1. (Dittable time (1))	New York, Will Manhow (Net)	
		Decovered hot	er .0				1	•		Discovery status			100 %	and w	
		Bappicatory	Ð	4				¢		DIRECTVERY BALE	1.14	P DOWN	M.S.		
		Lines services	0	1	•); B		8	( <b>0</b> );		Local (wheork2	- 18	1		North Contraction of the	
		Nativolit davida	0	4	<b>a</b>		8	¢.				Updanie UK 5230			
		SAMP read	D		a)		u-	0		Web monitoring					
		Vitual Isachine	0		9 ( ) ( )	1	8	1.01		HOST GROUP OF	TALE	D UNRACION	i i i	2	
		Wet servers	0	(e) -		1		0		Discovered forth 1	.0	3	CPU idle time [avg] 94.94 81.16 % 92.27 %	CPU idle time [avg] 68.12% 29.95% CPU idle time [avg] 68.12% 29.95%	
		Whiteway serve	m 0			)	8	0		Zabbiv servers 1	.0	.0	CPU system time [awg] 1.58 % 1.29 % 2.03 % CPU system time [awg] 1.58 % 1.29 % 2.03 %	CPU system time avg 7.11 % 4.5%	
		Zatibia servers	0	4	•		1	4				Updated, 08:50-40	CPU nice time [awg] 0 % 0 % 0 % CPU interrupt time [awg] 0 % 0 % 0.000288 %	CPU rice time avg. 0.0085 % 0 % CPU interrupt time avg. 0 % 0 %	
								ope	nowe: 08:50 45				CPU softing time [avg] 0.41% 0.17% 0.33% CPU stealtime [avg] 0% 0% 0%	CPU softirg time [avg] 0.06 % 0.03 % CPU steal time [avg] 0.% 0.%	
		10000											Dearthing through a 5.64 sec.	Deptermany, New York	

An active monitoring agent is installed on each equipment to monitor its activity. All the results are captured and sent to server for subsequent data processing.



11

Session 3 Presentation 3

**Operations 1** 

## Feature #4: Reservation System for Engineers

	i) <b>-</b>			
Beneron + O	<b>3</b>			Unable to find suitable system?
Succession Cold Street			Columns 👻	Total System Count : 5269 System Total Available Count : 5249 System
Add To Cart	Collateral Name	Collaberal Type	System Stats	Your selected System(s)
•	Equipment	Selectio	n	ADL-PS 01 - • ADL-PS 01 SUT • ADL-PS 01 Hest
	ADCPS 01 SUT	SUT	RESERVED	
<ul> <li>Reservation Nam</li> </ul>	ne: Alder Lake-P DDR5 RVP_5103 (Warm Archive) - 2 Items			
+	Alder Lake-P DDR5	Host	AVAILABLE	
+	Alder Lake-P DDR5 RVP_5103	SUT	AVAILABLE	
<ul> <li>Reservation Nam</li> </ul>	ne: Alder Lake-P DDR5 RVP_\$104 (Warm Archive) - 2 items			
+	Alder Lake-P DDR5	Host	AVAILABLE	
+	Alder Lake-P DDRS RVP_S104	SUT	AVAILABLE	
+ Reservation Nam	ne: Alder Lake-P DDR5 RVP_\$105 (GCS/ICS) - 2 items			Nex
+	Alder Lake-P DDRS	Host	AVAILABLE	L

Test**ConX** 

et alter 1 UND RUF\_3 INS PE DERS IN P. 3105 (DCGLICG) - 2 Items FLIALE P DERS IN AVAILABLE FLIALE P DERS IN AVA

Home > Reservation > Make a Reservation 1. Select System 2. Reservation Confirmation April 2022 • TODAY DAY WEEK WORK WEEK MONTH MONTH AGENDA Sunday Monday Tuesday Wednesday Thursday Friday Saturday 28 29 Apr 1 4 5 ADI -PS 12 15 18 19 22 23 **Reservation Confirmation** Reservation Start Assign PDL Assign Users (Reservation start time must be 5 Please Enter IDSID / Full Na Please Enter PDL Name mins after current time) 4/18/2022 12:16 AM Reservation End\* No Users No PDL Remove 4/18/2022 12:46 AM No Pdl No Users All Day Nx-Lab: The Next Generation Test Floor Management System 12

#### TestConX 2022

**Operations 1** 

## **Feature #5: User Direct Access to Equipment**

Ad Copy Modify Delete Export	import Collaterals	Ø Re-init		Tot	tal Available Count tal In Use Count : 0 tal Maintenance Co	: 5249 System System unt : 19 System
Systen Systen	n Acces	SS	F	Pow	ver Co	ontrol
Collateral Name	Remote C	Remote Console (VNC)	Power Co	lottes	System Status	System Typ
			[			i i
ADL-PS 01 SUT	0		O	00	AVAILABLE	PUBLIC
ADL-PS 01 Host	0				AVAILABLE	PUBLIC
Warm Archive) - 2 items						
Alder Lake-P DDR5 RVP_5103	0		0	00	AVAILABLE	PRIVATE
Alder Lake-P DDR5 RVP_5103_Debug Host	0				AVAILABLE	PRIVATE
Warm Archive) - 2 items						
Alder Lake-P DDR5 RVP_5104	0		O	00	AVAILABLE	PRIVATE
Alder Lake-P DDR5 RVP_5104_Debug Host	0		L		AVAILABLE	PRIVATE
Incelles, 2 Home	·2					
m n 1 2 3 4 5 264 x	11 00	- Systems per pa			1 of 2	64 (5269 items)

User can access to the system by clicking the "play button", as well as perform power cycling thru the "power control buttons"

Nx-Lab: The Next Generation Test Floor Management System

13

Test**ConX**\*

**Operations 1** 



### TestConX 2022

**Operations 1** 



TestConX Workshop

www.testconx.org

May 1-4, 2022

#### **TestConX 2022**

**Operations 1** 

## **Business Impact & Summary**

Nx-Lab has successfully

- 1. Simplified the integration of multi-path cluster tools in the production environment.
- 2. Enhanced the data visibility by providing more insights for product planning to deliver.
- 3. Provide a 1-Stop solution for factory, by integrating remote access and equipment management features for user.
- 4. Helped to address "work-from-home" constrain for engineers and supplier to support remote troubleshooting activities in production environment.



Nx-Lab: The Next Generation Test Floor Management System

#### TestConX 2022

Operations 1

## **Acknowledgements**

- Chan, Eric WP: VP in Internet of Things Group
- Goh, Kean Hean: Director in Internet of Things Group
- Lau, Siew Fui: PMP in Internet of Things Group
- McGrath, Adam J: Director in IT Lab Compute
- Lim, Ting Wei: Info Tech Manager in IT Lab Compute
- Goh, Hooi Ming: Product Owner in IT Lab Compute



Nx-Lab: The Next Generation Test Floor Management System

# With Thanks to Our Sponsors!





# With Thanks to Our Sponsors!





## **COPYRIGHT NOTICE**

The presentation(s) / poster(s) in this publication comprise the Proceedings of the TestConX 2022 workshop. The content reflects the opinion of the authors and their respective companies. They are reproduced here as they were presented at the TestConX 2022 workshop. This version of the presentation or poster may differ from the version that was distributed at or prior to the TestConX 2022 workshop.

The inclusion of the presentations/posters in this publication does not constitute an endorsement by TestConX or the workshop's sponsors. There is NO copyright protection claimed on the presentation/poster content by TestConX. However, each presentation / poster is the work of the authors and their respective companies: as such, it is strongly encouraged that any use reflect proper acknowledgement to the appropriate source. Any questions regarding the use of any materials presented should be directed to the author(s) or their companies.

"TestConX", the TestConX logo, and the TestConX China logo are trademarks of TestConX. All rights reserved.