Prognosis Automation

Workflows with Node.js

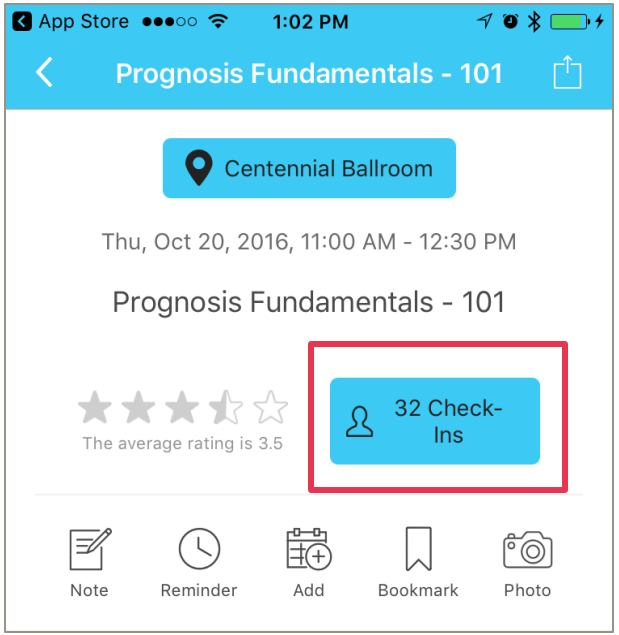
Wednesday, October 18, 2017

John Dunne

Welcome!

Download & check-in

see your attendance record, remember what tests to take and help us improve



WiFi SSID: IRsummit

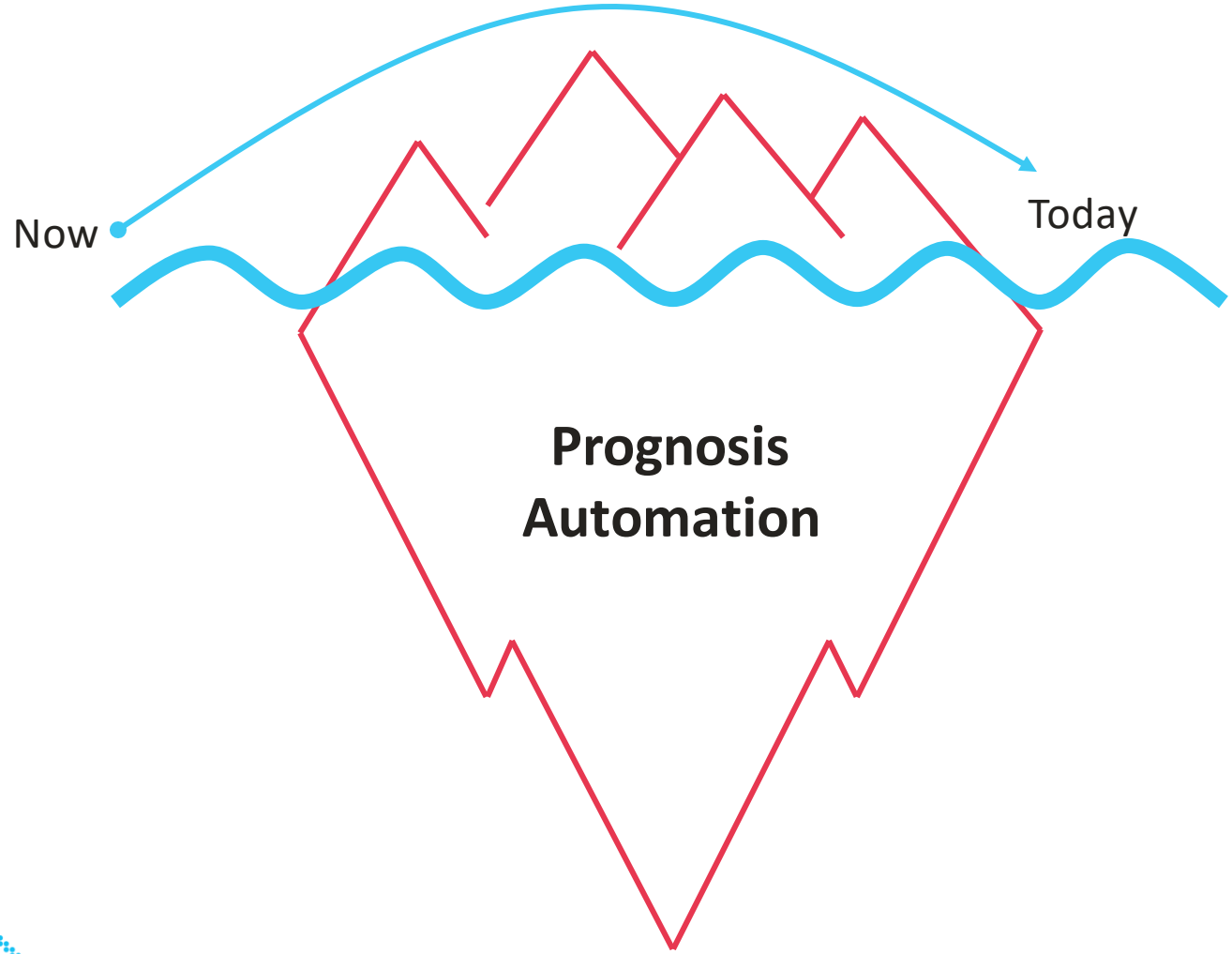
WiFi PW: Prognosis

Summit prognosis

Logistics

- **WiFi SSID:** IRsummit
- **WiFi PW:** Prognosis

- Download the Slides
  - https://online.prognosis.com
- Node.js documentation:
  - https://nodejs.org/dist/latest-v6.x/docs/api/



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Agenda

Part 1

- Prognosis Automation
- My first workflow
- Core Node.js paradigms
- Executing process
- Retrieving Prognosis data

Part 2

- Solution study
- Display integration
- Parameters
- Advanced Node.js

Part 1 Learning Objectives

- After completing this course you should:
  - Know how to invoke a workflow
  - Know where a workflow will run
  - Understand the components of a workflow
  - Be able to modify an existing workflow
  - Execute a process within a workflow
  - Retrieve Prognosis data within a workflow

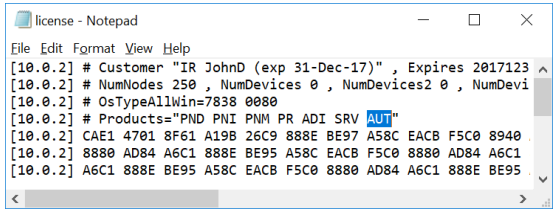
Node.js

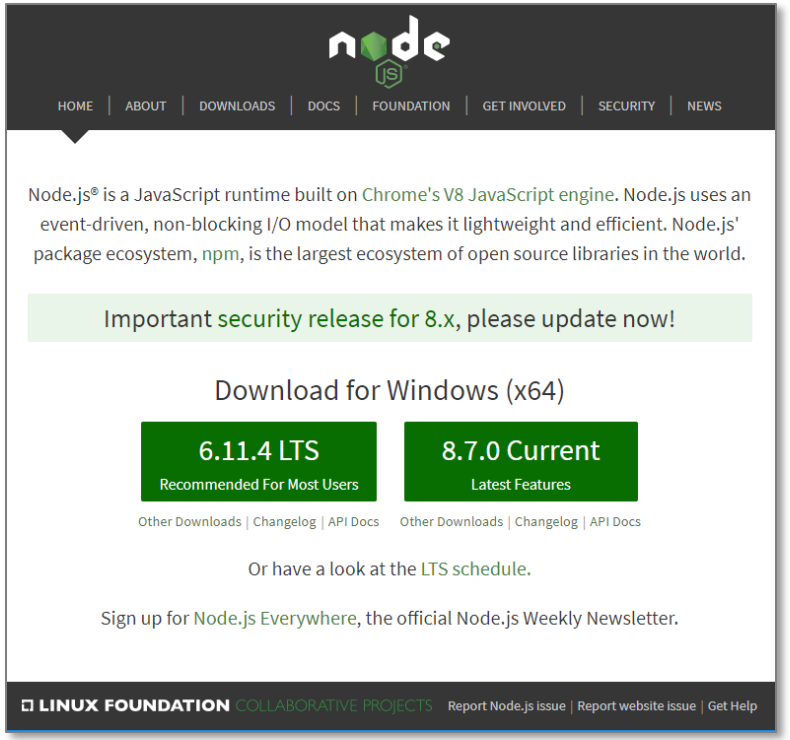
Prognosis works with Node.js.

- server-side JavaScript
- www.nodejs.org

Prognosis uses Node.js 6.x

- Node.js 8.x likely for P11.4
- requires AUT license key





Prognosis & Node.js

Prognosis can invoke Node.js via:

- the user interface
- a threshold

Node.js can interact with Prognosis:

- send trace information
- retrieve data through PQL
- create data in Prognosis records

Prognosis Workflows

A Workflow is a Prognosis concept

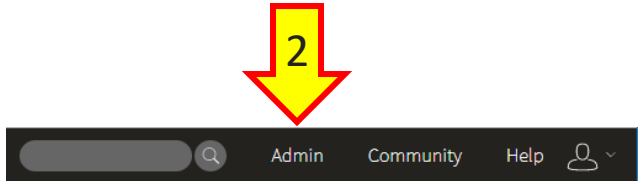
- Encapsulates everything Prognosis needs to know, to run a Node.js

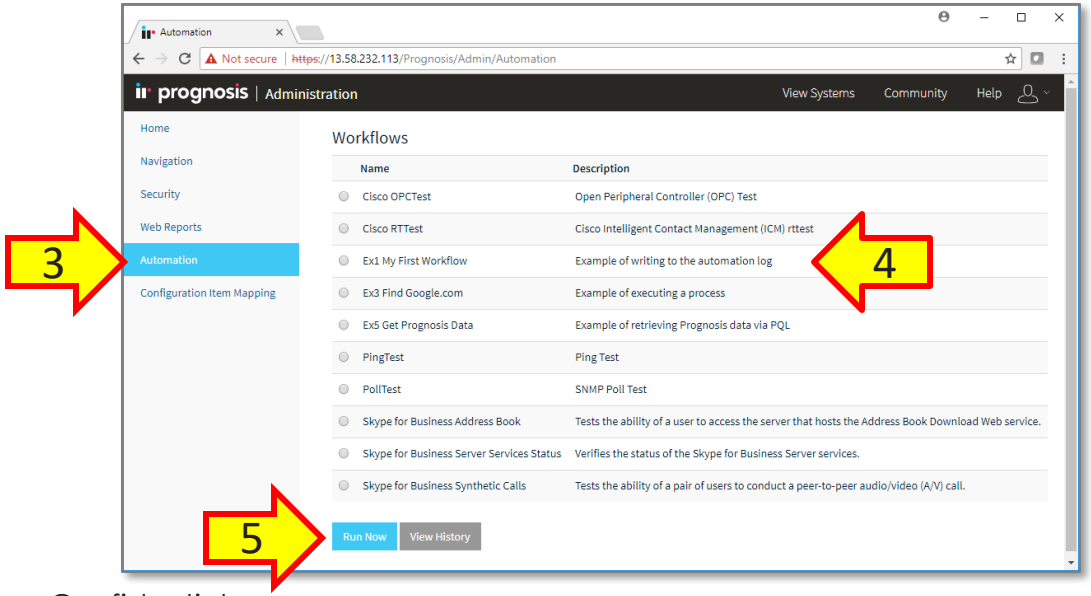
From the WebUI you can

- See all available workflows
- Invoke a workflow

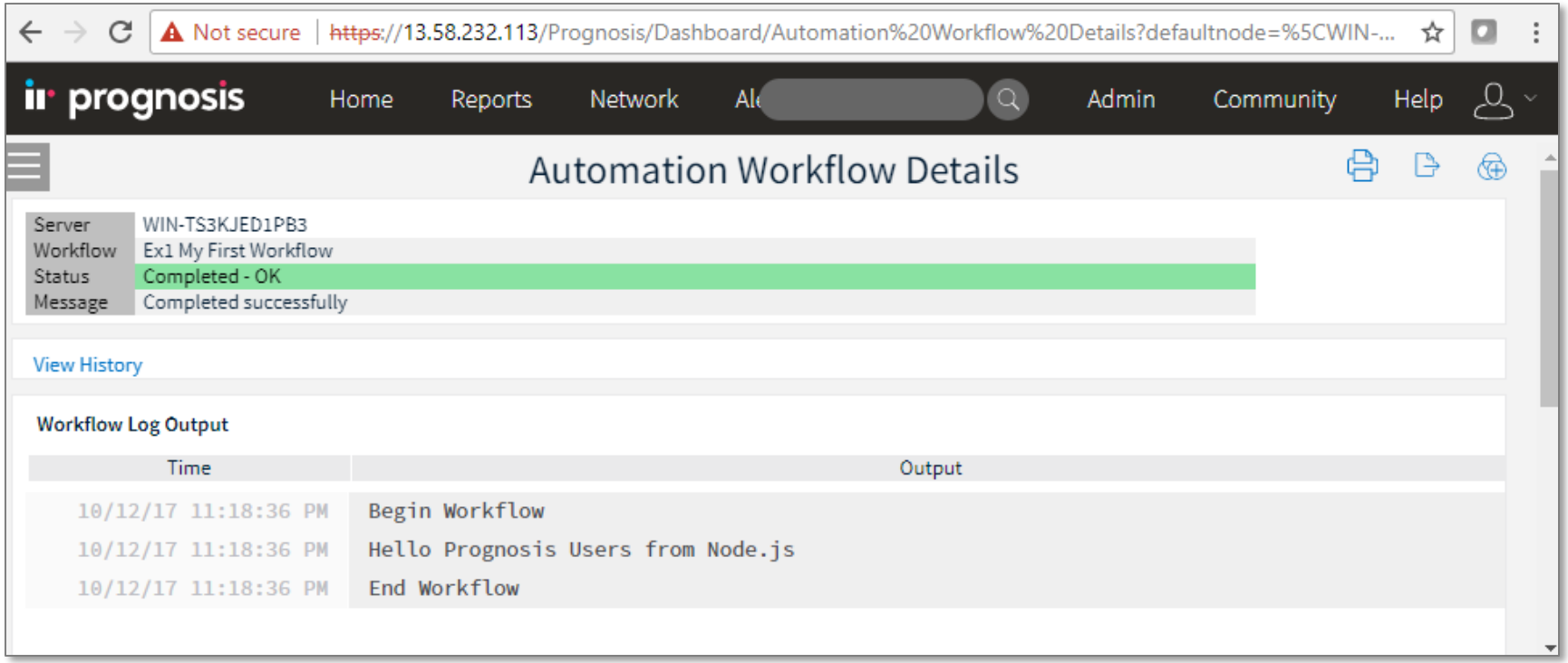
Exercise 1 – Run a Workflow

1. Log in to Prognosis
2. Switch to Admin view
3. Select Automation
4. **“Ex 1 My First Workflow”**
5. Click “Run Now”





Exercise 1 Output



Storage

Prognosis Workflow are stored on the WebUI Server

- WebUI\IIS\Automation\Workflow\<workflow name>

Let's take a look…

Anatomy

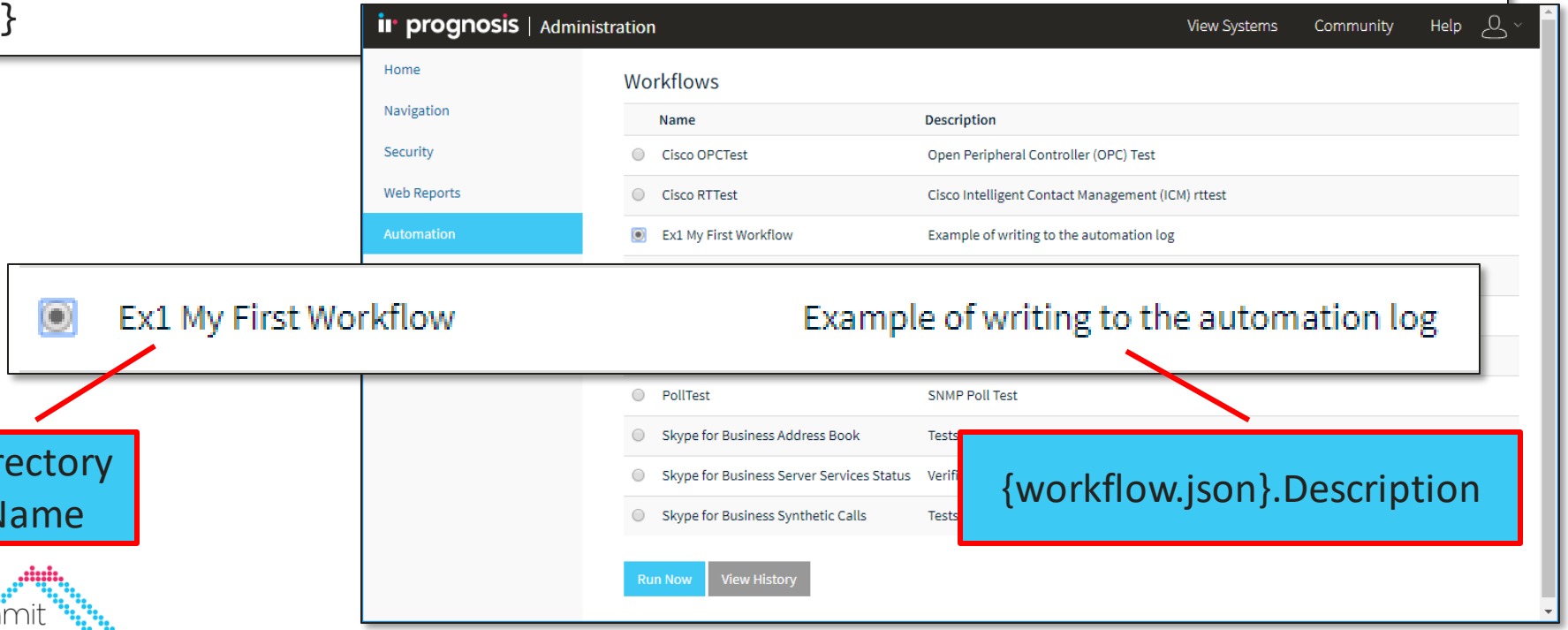
workflow.js the node.js file Prognosis will invoke (entry point)

workflow.json meta information about the workflow (name)

instance.json parameters for execution of the workflow

workflow.json

```
{
    "Description" : "Example of writing to the automation log"
}
```



instance.json

```
{
        "node" : "\\WIN-TS3KJED1PB3"
}
```

The Prognosis Server to execute the workflow on

Can contain additional parameters (more on that later)

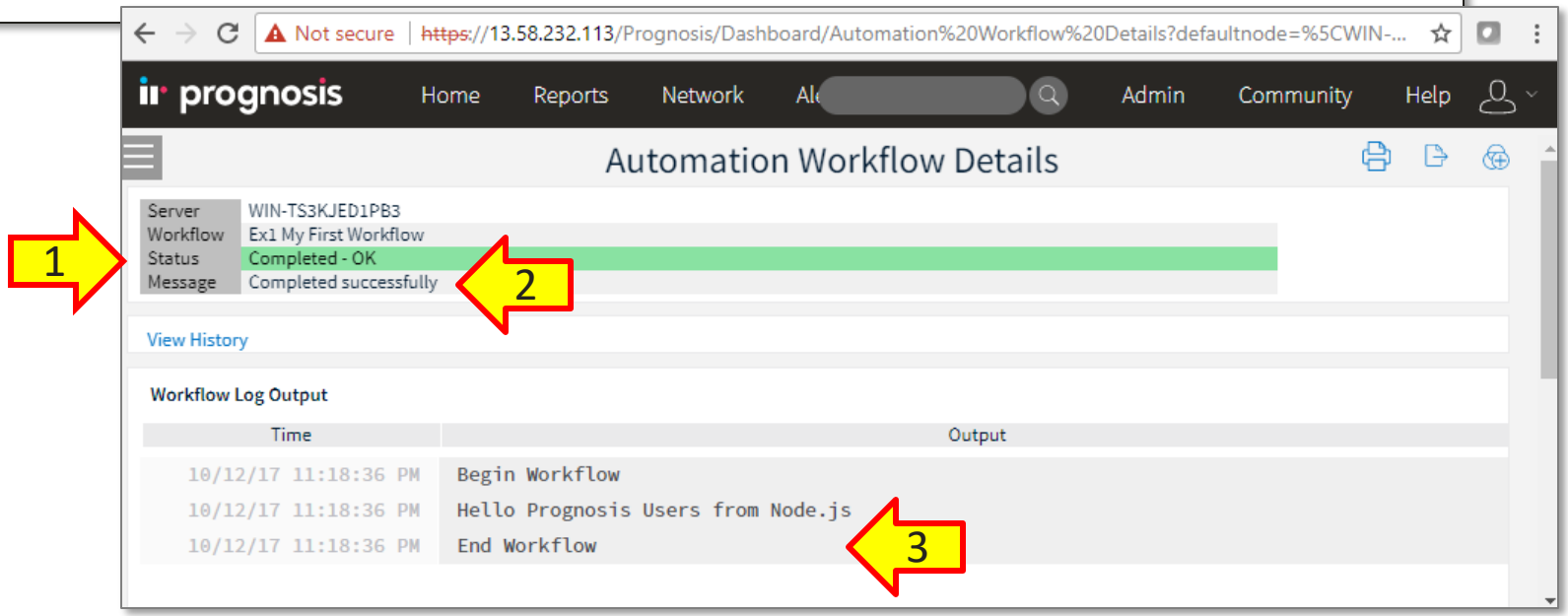
workflow.js

```
////////////////////////////////////////
// My First Workflow

/*jslint node: true */
/*jslint plusplus: true */
"use strict";
const wf = require('../../Engine/workflow_lib');

try
{
    //Prelude
```

The workflow logic starts here

workflow_lib

```
1. wf.updateStatus(wf.status.completedOK);
2. wf.updateMessage('Completed successfully');
3. wf.logOutput('End workflow');
```



wf.status

```
//Defintion
status = {
    completedOK:        1,
    completedError:     2,
    inProgress:         3,
    failed:             4,
    terminated:         5
};
```

Exercise 2 – Clone & Customize

1. File copy the entire folder
   - Rename to Ex2…
2. Edit files
   - Personalize the description & message
3. Run it

Use Cases (interaction)

- Execute a process
  - E.g. Basic diagnostic checks: DNS, ping, tracert
- Integrate a system
  - E.g. HTTPS into Time Management to find a person on duty
- Interrogate an application
  - E.g. REST API into an otherwise unmanaged application
- Interface to a device
  - E.g. Telnet into and reboot a Wi-Fi access point

Use Cases (internal)

- Read Prognosis data
  - E.g. Complex state machine
- Create Prognosis data
  - E.g. Download the weather and put in a record
- Reconfigure Prognosis
  - E.g. Add a PBX / Server, stop/start database/threshold
- Access Secure Prognosis Credentials
  - E.g. Credentials for Wi-Fi access point (for telnet)

Executing a Process

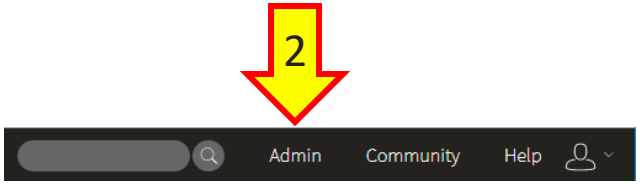
TraceRt (aka TraceRoute)

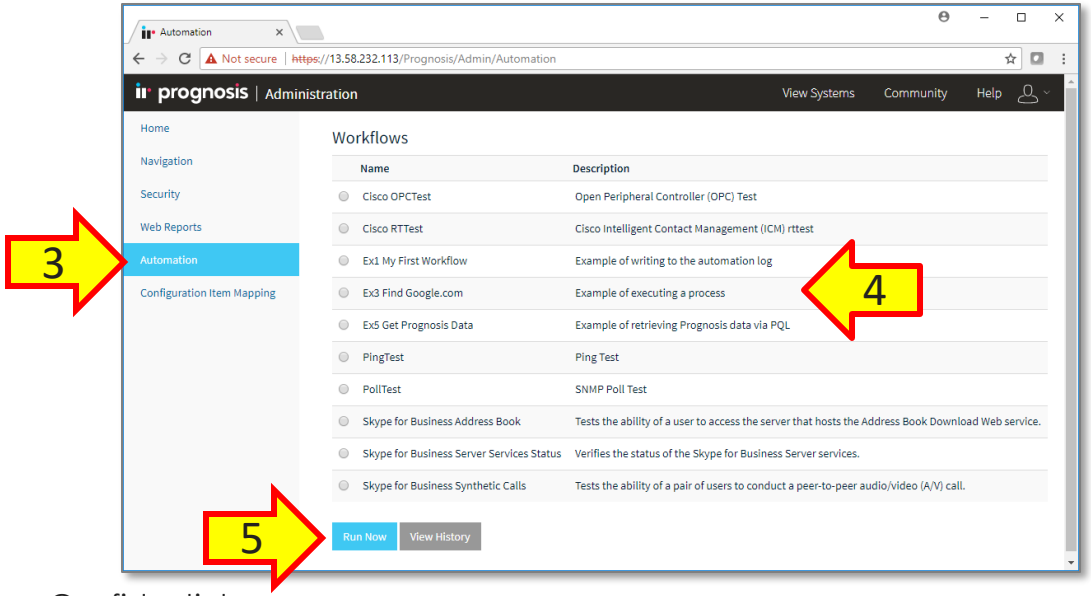
Simple diagnostic

- can the DNS be resolved?
- what is the network path?
- does it respond to ping?

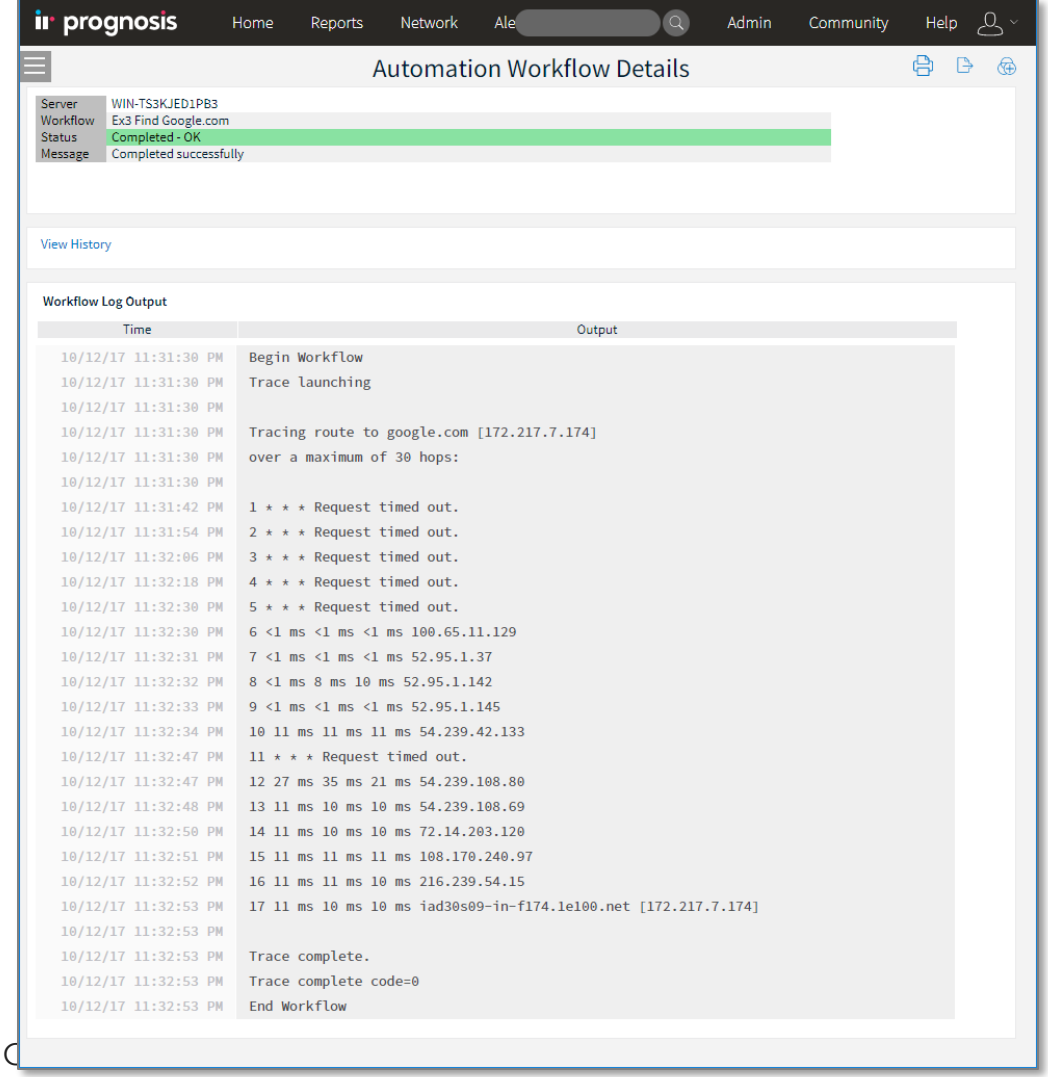
Exercise 3 – Find Google.com

1. Log in to Prognosis
2. Switch to Admin view
3. Select Automation
4. **“Ex3 Find Google.com”**
5. Click “Run Now”





Exercise 3 Output



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Child_Process

Spawn

- Any application
- stdout pipe
  - read as created
- detach available

https://nodejs.org/dist/latest-v6.x/docs/api/child_process.html#child_process_child_process_spawn_command_args_options

Exec

- Command line / console
- stdout string
  - at completion
- timeout available

https://nodejs.org/dist/latest-v6.x/docs/api/child_process.html#child_process_child_process_exec_command_options_callback

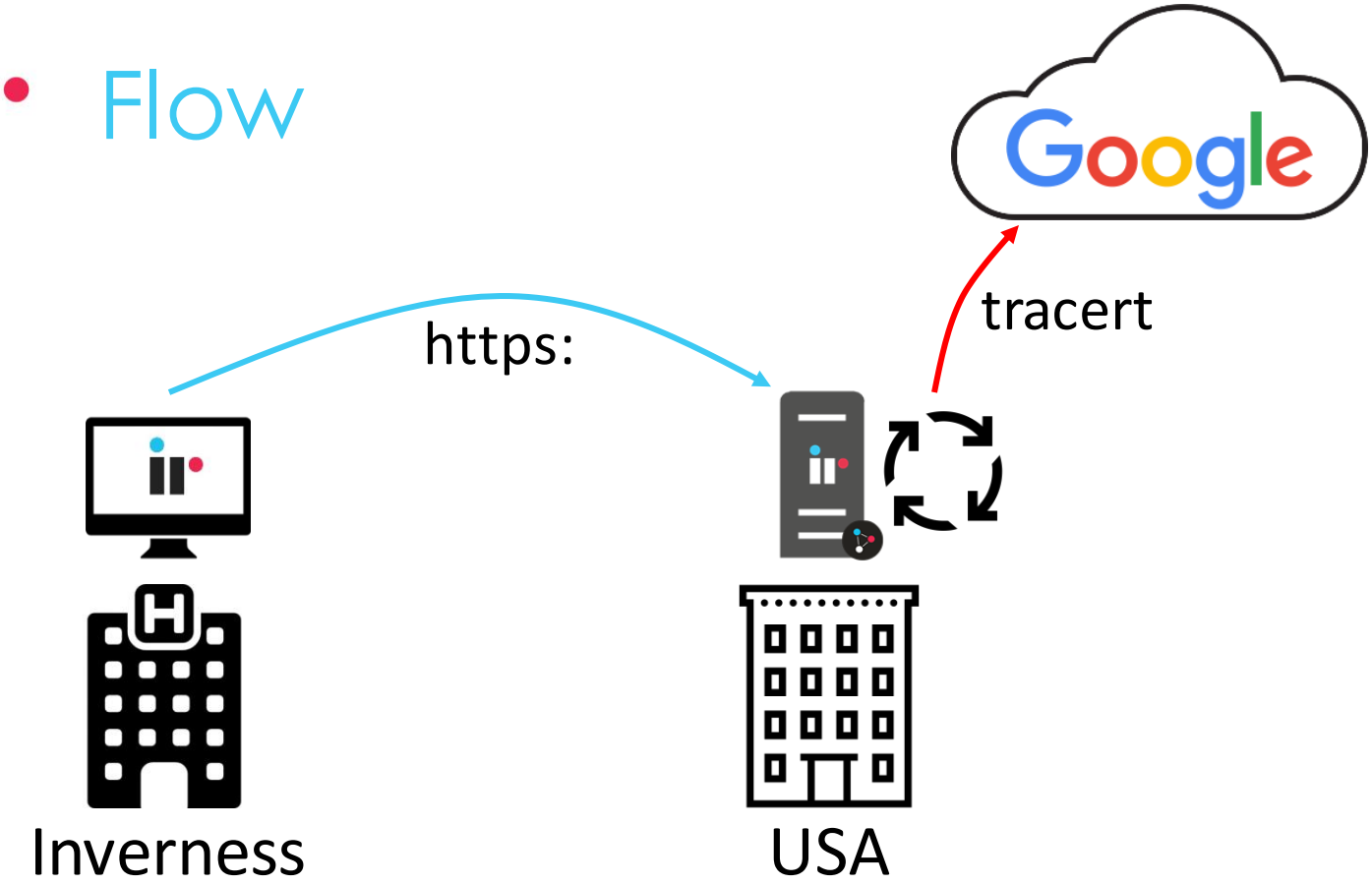
Second Instance

Fact: TraceRt takes time to run.

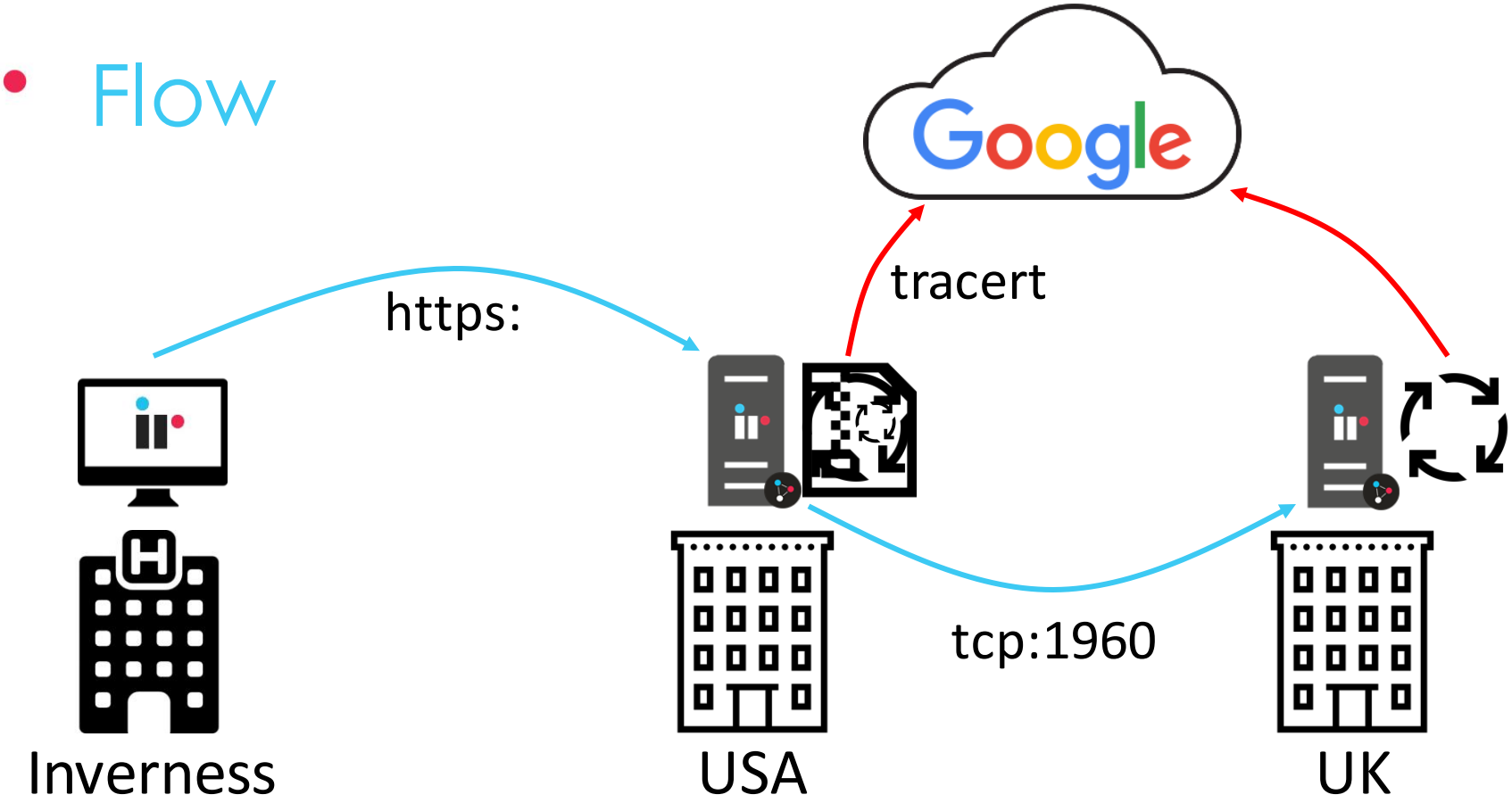
Q: What happens if I run a second instance of the workflow (on the same machine)?

A: The running instance is aborted, and the new instance is started.

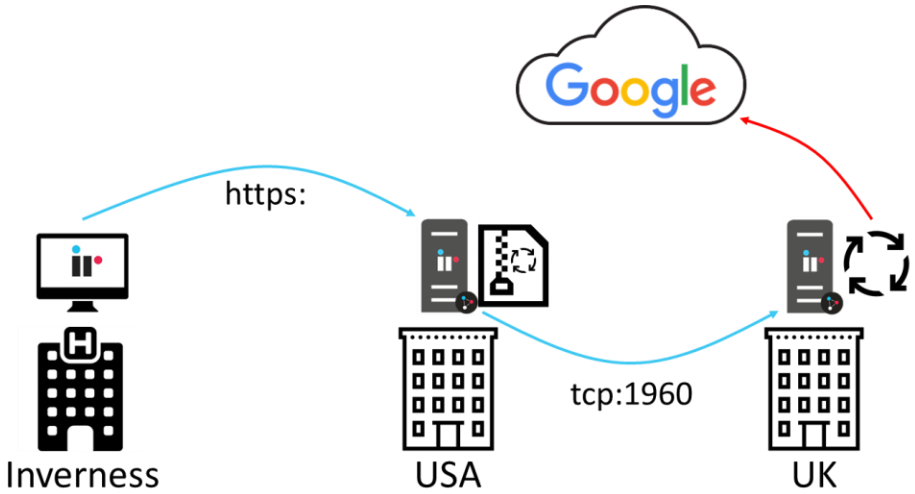
Flow



Flow



Exercise 4



London Server:

\\WIN-L7MVFNG405G

Modify workflow…

name

instance.json

Node.js Paradigms

1. Template Literals
   - Simply formatting messages with data
2. Exceptions vs Errors
   - When to throw, when to return
3. Asynchronous Functions
   - Understanding code and it's order of execution, especially with Events
4. Paradigms for robust & simple code
   - Looping around asynchronous functions
   - Conditionally executing asynchronous functions

Template Literals

String concatenation:

```
'CPU ' + record.CpuNumber + ' = ' + record.BusyPercent + '%'
```

String template:

```
`CPU ${record.CpuNumber} = ${record.BusyPercent}%`
```

Enables:

- String interpolation (runtime evaluation of ${variable})
- Multi-line strings (just hit enter)

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Errors

err is an instance of an Error class
- but sometimes a String if I'm lazy

```
return
  process.nextTick(done, 'Opps!');
```

Return err as a parameter in callbacks
- unable to succeed

```
if (err)
  return process.nextTick(done, err);
```

Throw err on terminals issues only
- abort the workflow

```
if (err) throw err;
```

Catch err at the root
- inform the user, contain the situation

```
try{  //Do stuff
}
catch(err){  //Handle err
}
```

Asynchronous Functions


```
const fs = require('fs');

console.log('Start');

fs.readFile('input.txt', (err, data) => {
    if (err) throw err;
    console.log(data);
});

console.log('Done');
```

```
Start
Done
data
```

Looping with Async Functions

```
var    todoList = […];      //list to process
var    doIt = function(todoIndex, done) {  //process one
       if (todoIndex >= todoList.size) return process.nextTick(done); //done
       //do async operation
       doAsyncOperation(todoList[todoIndex], (err) {
              if (err) return process.nextTick(done, err);  //error
              process.nextTick(doIt, todoIndex+1);    //next
       }
}
doIt(0);      //start processing
```

process.nextTick

```
process.nextTick(doIt, todoIndex+1);
        //vs
doIt(todoIndex+1);
```

Add it to the end of the message queue for execution when idle

vs

Push it on the call stack now and execute

Using PQL

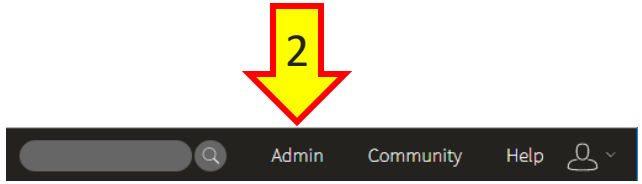
Any Prognosis record is accessible by PQL

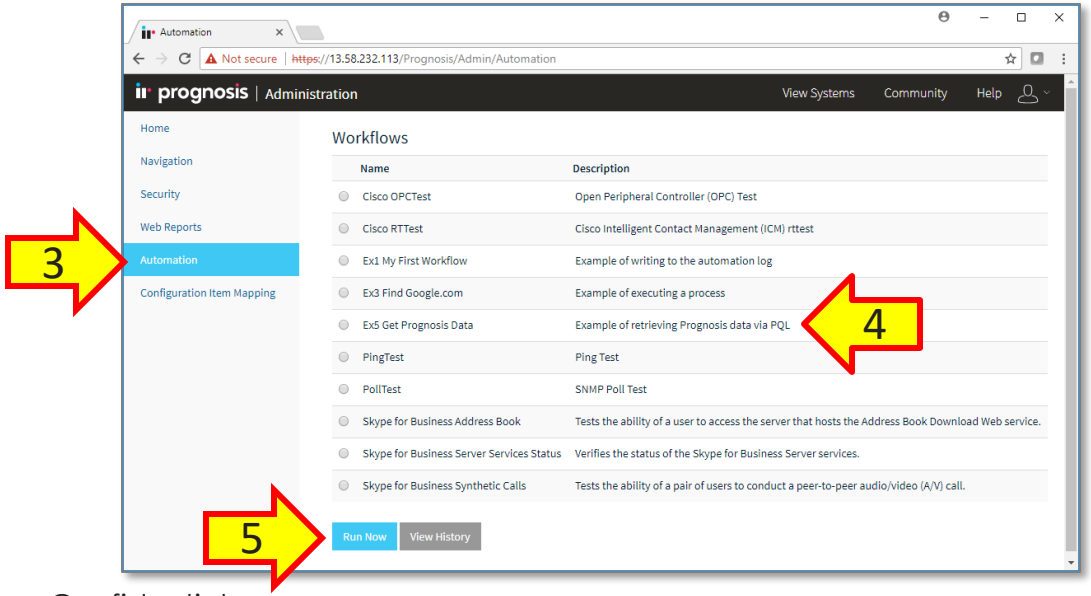
- Prognosis Query Language (pretty close to SQL)

```
SELECT CpuNumber, BusyPercent
FROM NTCPU
```

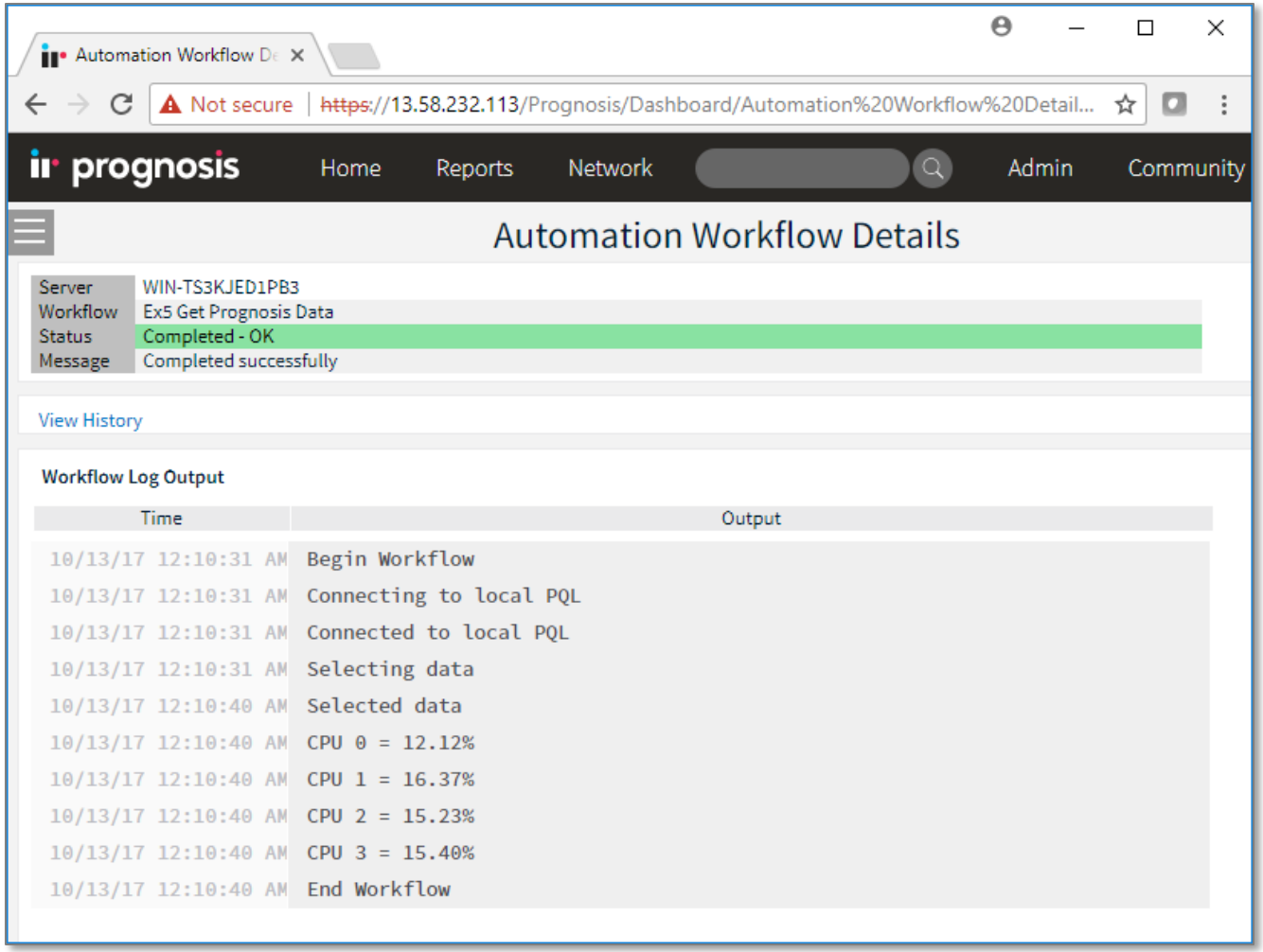
Exercise 5 – Get Prognosis Data

1. Log in to Prognosis
2. Switch to Admin view
3. Select Automation
4. **“Ex5 Get Prognosis Data”**
5. Click “Run Now”





Exercise 5 Output



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Using PQL

Any Prognosis record is accessible by PQL

- Prognosis Query Language (pretty close to SQL)

```
SELECT CpuNumber, BusyPercent
FROM NTCPU
```

workflow-pql

```
const PQL = require('./workflow-pql').PQL;
```

Prognosis 11.3 has a very raw PQL interface, so I created this wrapper class.

- It requires ‘./workflow-logger’ (wraps default logger)
- Just include files in the workflow folder!

workflow-pql

```
var pql = new PQL();

pql.connect( function(err, data) {});

pql.select('SELECT * FROM NTCPU', function(err, ntCPU) {});

ntCPU[0].CpuNumber
```

Field name

row

workflow-pql

```
var pql = new PQL();

pql.selectBatch( ['SELECT * FROM NTCPU',
                  'SELECT * FROM NTCPU'],
                 function(err, tables) {});
```

table

```
tables.NTCPU[0].CpuNumber
```

Field name

row

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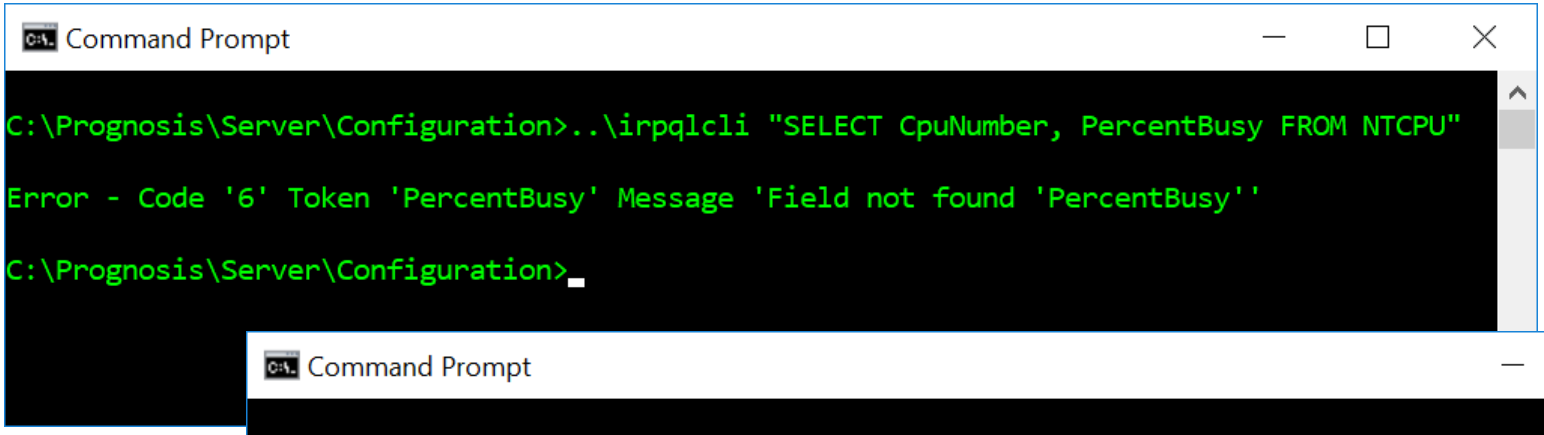
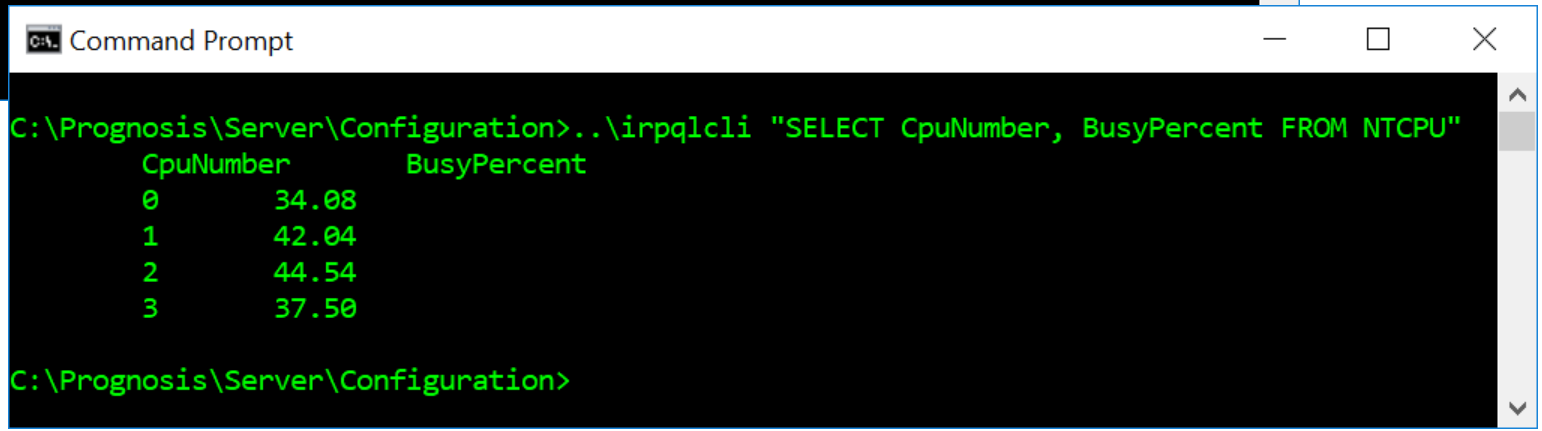
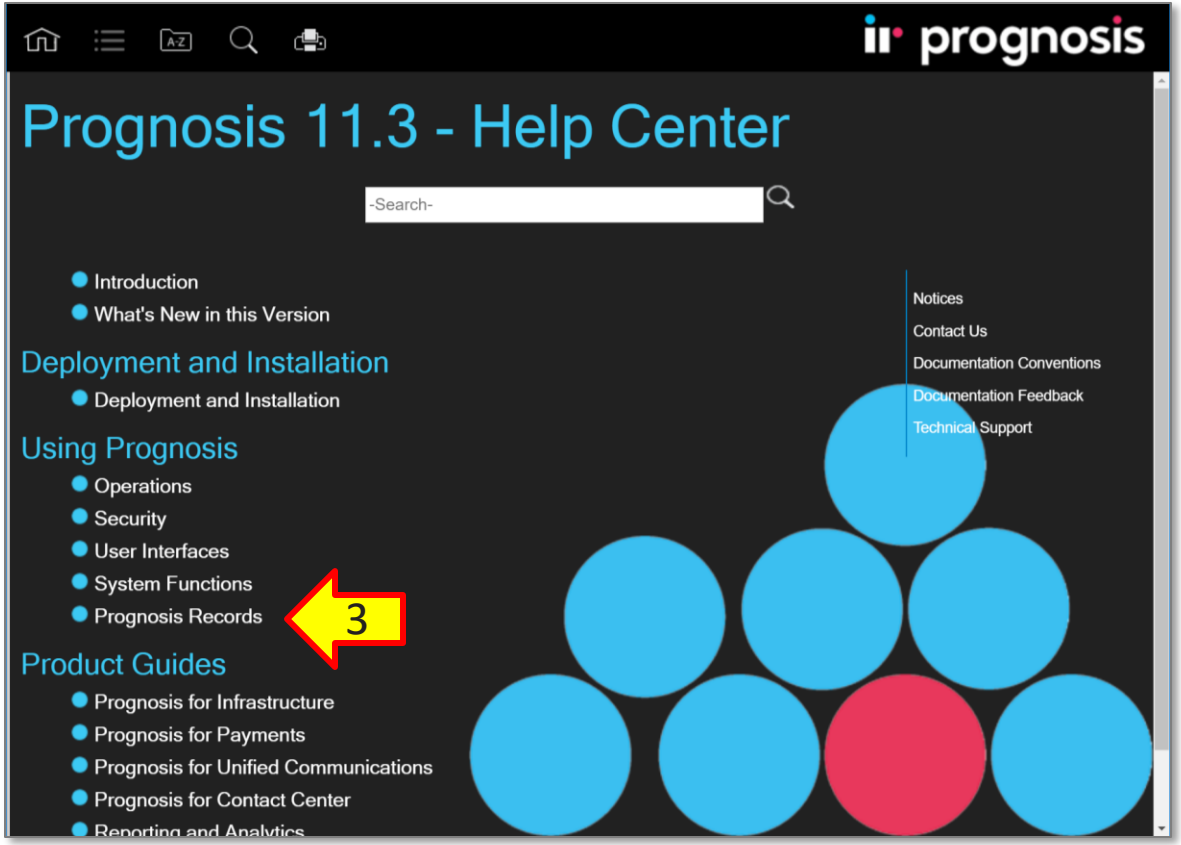
Test PQL


Command Prompt
C:\Prognosis\Server\Configuration>..\irpqlcli "SELECT CpuNumber, PercentBusy FROM NTCPU"
Error - Code '6' Token 'PercentBusy' Message 'Field not found 'PercentBusy''
C:\Prognosis\Server\Configuration>


Command Prompt
C:\Prognosis\Server\Configuration>..\irpqlcli "SELECT CpuNumber, BusyPercent FROM NTCPU"
CpuNumber BusyPercent
0 34.08
1 42.04
2 44.54
3 37.50
C:\Prognosis\Server\Configuration>

What are the records?

1. Log in to Prognosis
2. Online Help
3. **Prognosis Records**
4. Long Record Names



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Exercise 6
Get the Busiest Processes

1. Copy “Ex 5 Get Prognosis Data” to “Ex 6 Get Busiest Processes”
2. On the command line, verify a statement to get the busiest 20 processes
3. Update the Workflow
4. Run it!

Tip - Record

Record = NtProcess

- ProcessId
- ProcessName
- BusyPercent
- BusyUserPercent
- BusyPrivilegedPercent

Tip - PQL

```
SELECT TOP 10
ProcessId, ProcessName, BusyPercent
FROM NtProcess
ORDER BY ProcessName DESC
```

Prognosis Automation

Workflows with Node.js

Wednesday, October 18, 2017

John Dunne

Agenda

Part 1

- Prognosis Automation
- My first workflow
- Core Node.js paradigms
- Executing process
- Retrieving Prognosis data

Part 2

- Solution study
- Display integration
- Parameters

Part 1 Learning Objectives

- After completing this course you should:
  - Familiar with display integration
  - Be able to pass parameters
  - Be able to read parameters

Test Your Knowledge

What license code enables Prognosis Workflows?

a) WFL
b) AUT
c) WOR
d) PWF

Test Your Knowledge

Which 3 files are required in a Workflow file?

a) workflow.js
b) workflow.json
c) instance.js
d) instance.json

Test Your Knowledge

What Node.js library enables sending status and messages to Prognosis?

a) workflow_lib.js
b) prognosis.js
c) workflow.js
d) prognosis_lib.js

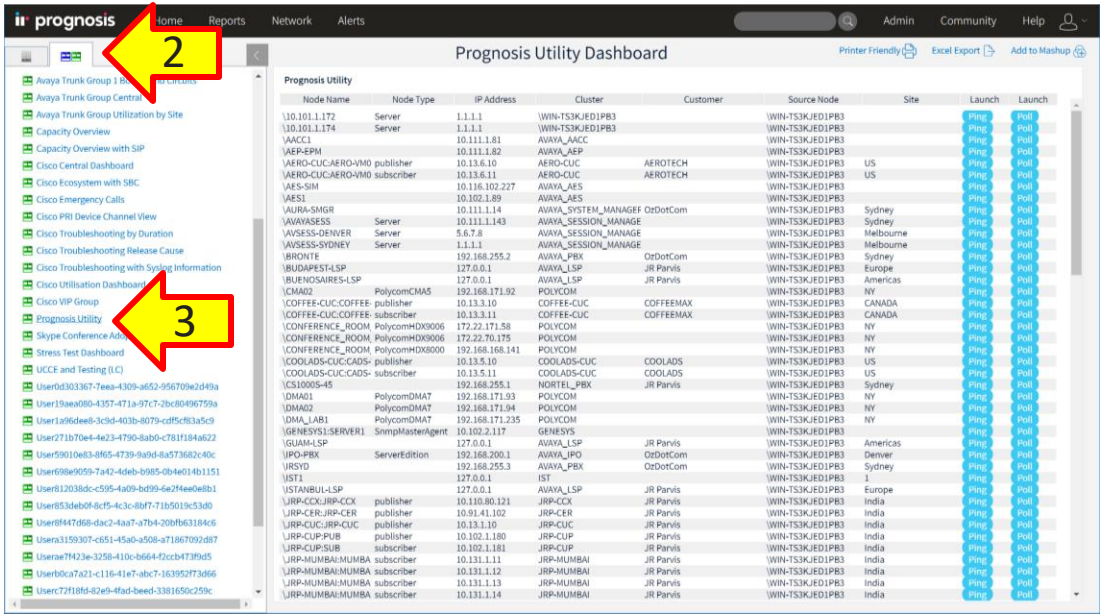
Test Your Knowledge

Which command is best for executing a command and reading the entire output as a string?

a) child_process.spawn
b) child_process.exec
c) child_process.run

Ping Get the Busiest Processes

1. Log into Prognosis
2. Second navigation tab
3. Prognosis Utility



Prognosis Utility Dashboard

Printer Friendly | Excel Export | Add to Mashup

Prognosis Utility

Node Name	Node Type	IP Address	Cluster	Customer	Source Node	Site	Launch	Launch
\10.101.1.172	Server	1.1.1.1	\WIN-TS3KJED1PB3		\WIN-TS3KJED1PB3		Ping	Poll
\10.101.1.174	Server	1.1.1.1	\WIN-TS3KJED1PB3		\WIN-TS3KJED1PB3		Ping	Poll
\AACC1		10.111.1.81	AVAYA_AACC		\WIN-TS3KJED1PB3		Ping	Poll
\AEP-EPM		10.111.1.82	AVAYA_AEP		\WIN-TS3KJED1PB3		Ping	Poll
\AERO-CUC:AERO-VM01	publisher	10.13.6.10	AERO-CUC	AEROTECH	\WIN-TS3KJED1PB3	US	Ping	Poll
\AERO-CUC:AERO-VM02	subscriber	10.13.6.11	AERO-CUC	AEROTECH	\WIN-TS3KJED1PB3	US	Ping	Poll
\AES-SIM		10.116.102.227	AVAYA_AES		\WIN-TS3KJED1PB3		Ping	Poll
\AES1		10.102.1.89	AVAYA_AES		\WIN-TS3KJED1PB3		Ping	Poll
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\AVSESS-DENVER	Server	5.6.7.8	AVAYA_SESSION_MANAGER		\WIN-TS3KJED1PB3	Melbourne	Ping	Poll
\AVSESS-SYDNEY	Server	1.1.1.1	AVAYA_SESSION_MANAGER		\WIN-TS3KJED1PB3	Melbourne	Ping	Poll
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\DMA_LAB1	PolycomDMA7	192.168.171.235	POLYCOM		\WIN-TS3KJED1PB3	NY	Ping	Poll
\GENESYS1:SERVER1	SnmpMasterAgent	10.102.2.117	GENESYS		\WIN-TS3KJED1PB3		Ping	Poll
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\IRSYD		192.168.255.3	AVAYA_PBX	OzDotCom	\WIN-TS3KJED1PB3	Sydney	Ping	Poll
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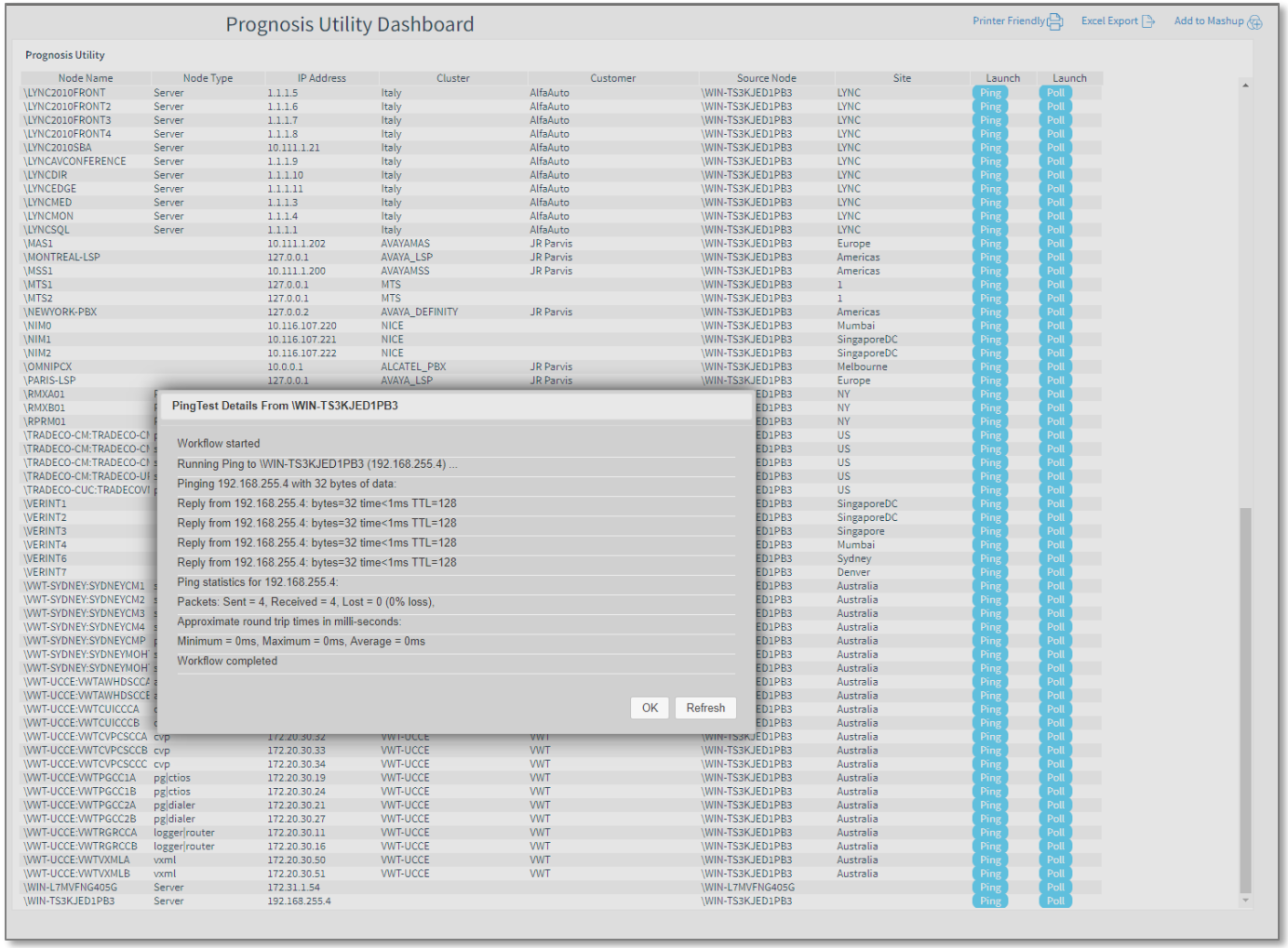
Summit
prognosis


Prognosis Utility Dashboard
Printer Friendly
Excel Export
Add to Mashup
Prognosis Utility
Node Name
Node Type
IP Address
Cluster
Customer
Source Node
Site
Launch
Launch
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\WIN-L7MVFNG405G Server 172.31.1.54 \WIN-L7MVFNG405G Ping Poll
\WIN-TS3KJED1PB3 Server 192.168.255.4 \WIN-TS3KJED1PB3 Ping Poll
PingTest Details From \WIN-TS3KJED1PB3
Workflow started
Running Ping to \WIN-TS3KJED1PB3 (192.168.255.4) ...
Pinging 192.168.255.4 with 32 bytes of data:
Reply from 192.168.255.4: bytes=32 time<1ms TTL=128
Reply from 192.168.255.4: bytes=32 time<1ms TTL=128
Reply from 192.168.255.4: bytes=32 time<1ms TTL=128
Reply from 192.168.255.4: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.255.4:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
Workflow completed
OK
Refresh

How this works

1. Custom Dashboard
2. Modify field display
3. Add a drilldown to Automation Service

.dashboard

File name = URL

Stored in:

\WebUI\IIS\Dashboards\User

Created by:

a) Publishing a Windows display & modify it

Columns to Initiate Workflow

```
<datafield
   name="PrognosisNode_PingTest“
   visible="true“
   static="true“
   precision="-1“
   command="true"
   automation="true"
>
```

Drilldown

```
<drilldown><query>
SELECT 'Automation Service?' +
  'workflow=' + URIENCODE('PingTest') +
  '&amp;' + 'DefaultNode=\' +
      URIENCODE(COALESCE(SourceNodeWhoRegisteredThisNode, '')) +
  '&amp;' + 'ip=' + URIENCODE(TcpIpAddress) +
  '&amp;' + 'node=\' + URIENCODE(COALESCE(PrognosisNodeName, ''))
AS PrognosisNode_PingTest,
FROM User_Custom_UtilityDashboard_PNodesView
^[Where_Interval]^
^[Latest]^
</query></drilldown>
```

Challenge 1

1. Create a custom display (maybe clone one)
   - Ensure it has a data table
2. Publish it to web
3. Add to the navigation pane (for easy access)
4. Modify the .dashboard to include Automation

Installing additional node_modules

Node_modules are stored in:

<Prognosis>\Nodejs\node_modules

From NodeJs directory use npm install

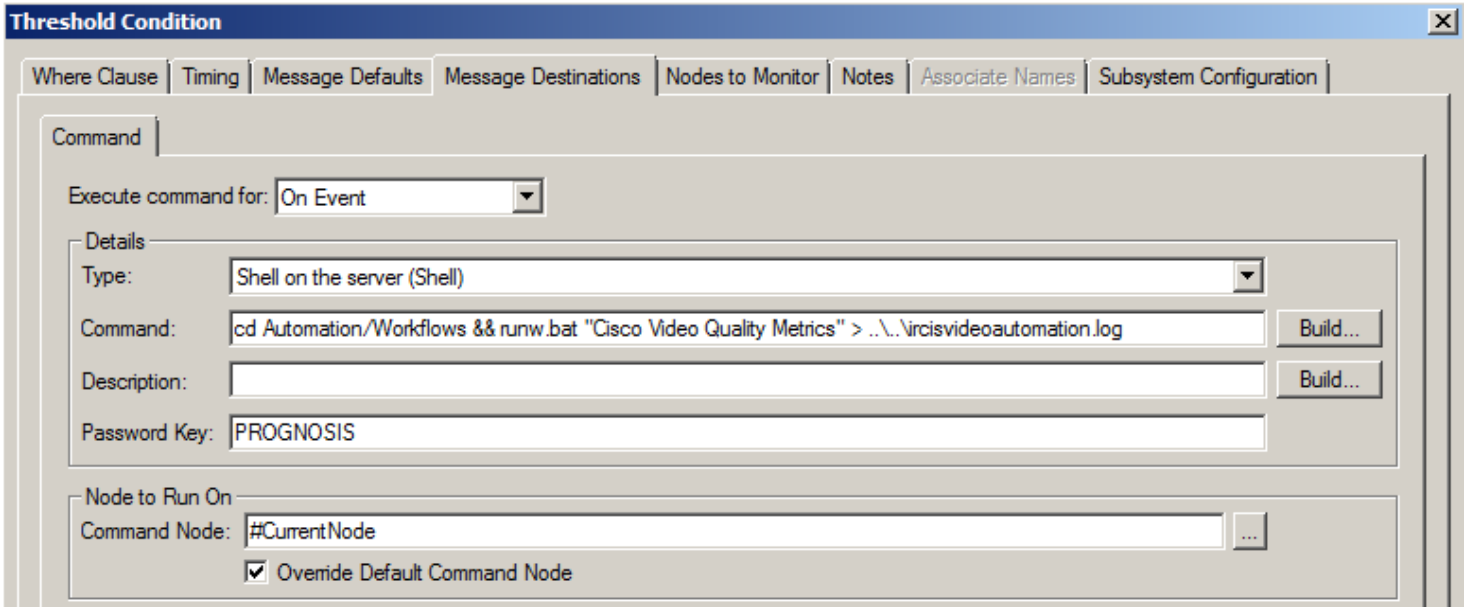
internet access required

<Prognosis>\Nodejs>npm install <package>

Invoking from a Threshold

Server\Configuration\Automation\workflow\runw.bat **"WorkflowName"**

Workflow needs to be on the server (already pushed to server)



Credentials from PQL

Retrieve credentials from the Passwords Config

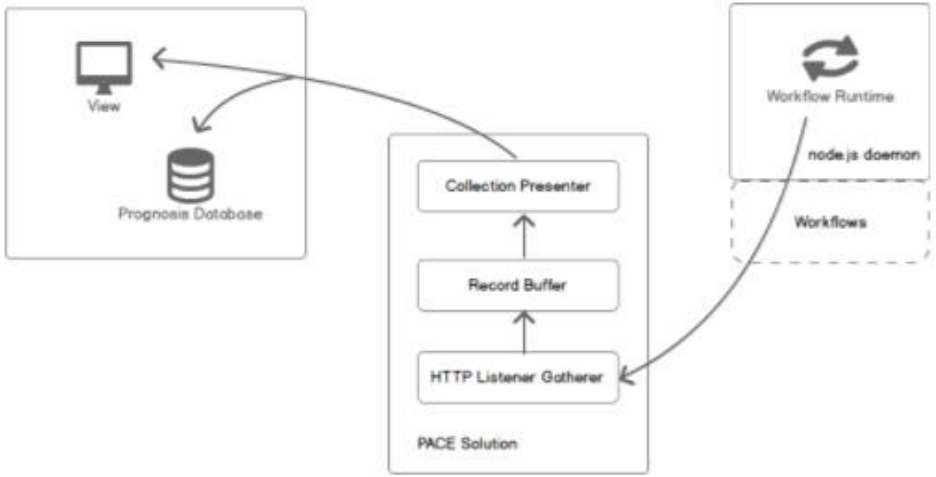
```
pql.getCredentials(key);
```

Only entries with AUTOMATION: prefix are accessible

Automation Collector

- Irautomation.exe (pace collector)
- Needs SDN Profile in AUTOMATION conf:

DEFINE SDN_PROFILE(Automation, "Url=http://*:1339/AutomationFeed", "site=Automation")



Troubleshooting

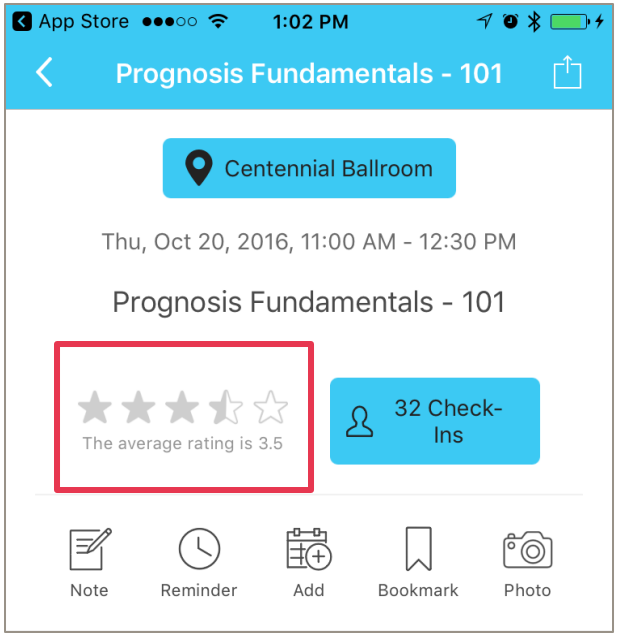
- License Key is present?
- irAutomation is running?
- Check the log file at C:\Prognosis\WebUI\IIS\Logs\PrognosisAutomationLog.txt
- User has permission to run automation?
- Run from command line and use console logging.

Power Tips

1. Asynchronous I/O, Trace & Crashes
   - assert wrapper to allow trace to be output before crash
2. Run from the console to debug
   - Encapsulated Prognosis Logger to support Console
3. 5 crashes rule
   - Many things could cause irAutomation.exe to crash (esp. logging)
   - Prognosis governor prevents restarting after 5
   - Restart Prognosis for a clean test run
4. Node.js is late bound & error code only runs when errors occur… so make errors to test
5. If the Node.js library is not shipped with Prognosis… you ship it!
6. Test PQL statements first
   - irPQLcli.exe (which must be invoked from the Configuration folder)
7. 2048 byte URL limit
   - Limits on parameters to Workflow (HTTP GET only)
8. Browser console.log
   - Enables F12 debugging

Next Steps

- **Please Rate the Class**
- **Take the Knowledge Reinforcement Test**
- **Log On to Online.Prognosis.com** to download slides & ask questions
- *Every class rating gets you a chance to win prizes!*



Questions?