PowerShell
for Oracle DBAs

DOAG Conference + Exhibition
Andreas Jordan
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anj@ordix.de www.ordix.de

What can you expect here?

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- A little HOW and a lot of WHY.
- My personal experiences.
- Highly simplified examples, as I do not have a realistic environment here.

Why PowerShell?

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- Available on any Windows system, no installation required.
  - PowerShell 5.1 is currently sufficient and is included in Windows Server 2016 and Windows 10.
  - PowerShell 7 is certainly the future and also runs on Linux.
  - PowerShell ISE is sufficient as "development environment" and for the daily work.
  - Visual Studio Code (VS Code) can be useful for more extensive scripts.
- By using .NET, it is a full-fledged object-oriented programming language.
  - Loops
  - Error handling
  - Logging
- I can run my scripts line by line.

What requirements must be met?

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odp.net \ managed \ common \ Oracle.ManagedDataAccess.dll

- Probably already installed in many environments:
  - Oracle Database 19c Client (19.3) for Microsoft Windows x64 (64-bit)
    - https://www.oracle.com/database/technologies/oracle19c-windows-downloads.html
    - Starting with version 21c only NuGet packages are included.

- If download is possible:
  - NuGet package Oracle.ManagedDataAccess for PowerShell 5.1 on Windows
    - https://www.nuget.org/packages/Oracle.ManagedDataAccess
  - NuGet package Oracle.ManagedDataAccess.Core for PowerShell 7 on Windows and Linux
    - https://www.nuget.org/packages/Oracle.ManagedDataAccess.Core

How to use the DLL in PowerShell?

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```
Add-Type -Path "…\Oracle.ManagedDataAccess.dll"
```

- This one line adds the .NET classes contained in the DLL to the PowerShell session.

- A few example classes:
  - Oracle.ManagedDataAccess.Client.OracleConnection
  - Oracle.ManagedDataAccess.Client.OracleCommand
  - Oracle.ManagedDataAccess.Client.OracleDataAdapter

Own commands as wrappers for the .NET classes

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- Direct access to the .NET classes is possible, but the code becomes confusing.
- Custom commands interface between PowerShell code and .NET classes.
- I use:
  - Connect-OraInstance
  - Invoke-OraQuery

And now comes the demo…

Connect-OraInstance

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```
$conString = "Data Source=...;User Id=...;Password=..."

$connection = [Oracle.ManagedDataAccess.Client.OracleConnection]::new($conString)

$connection.Open()
```

Invoke-OraQuery (I)

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```
$command = $Connection.CreateCommand()
$command.CommandText = $Query

$dataAdapter = [Oracle.ManagedDataAccess.Client.OracleDataAdapter]::new()
$dataAdapter.SelectCommand = $command

$dataSet = [System.Data.DataSet]::new()

$rowCount = $dataAdapter.Fill($dataSet)
```

Invoke-OraQuery (II)

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```
switch ($As) {

    'DataSet' {
        $dataSet
    }

    'DataTable' {
        $dataSet.Tables
    }

    'DataRow' {
        if ($dataSet.Tables.Count -ne 0) {
            $dataSet.Tables[0].Rows
        }
    }

}
```

Invoke-OraQuery (III)

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```
switch ($As) {

    'PSObject' {
        if ($dataSet.Tables.Count -ne 0) {
            foreach ($row in $dataSet.Tables[0].Rows) {
                [DBNullScrubber]::DataRowToPSObject($row)
            }
        }
    }

    'SingleValue' {
        if ($dataSet.Tables.Count -ne 0) {
            $firstColumn = $dataSet.Tables[0].Columns[0].ColumnName
            $dataSet.Tables[0].Rows | Select-Object -ExpandProperty $firstColumn
        }
    }

}
```

Loops, Error handling, Logging

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- Loops:
  - `foreach ($table in $selectedTables) { Invoke-OraQuery ... }`
  - Display of a status bar helps to answer the question: When is the process finished?
  - Individual processing for the development or analysis of errors possible.
- Error handling:
  - `try { Invoke-OraQuery ... } catch { Write-Warning "Failure: $_" }`
- Logging:
  - I use: https://psframework.org/ by Friedrich Weinmann (Microsoft employee)
  - `Write-PSFMessage -Level Host -Message "Starting Script..."`

And now comes the demo…

Excel as a popular data presentation program (I)

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I use ImportExcel by Doug Finke (https://github.com/dfinke/ImportExcel).

The module does not require Excel to be installed, but brings its own .NET classes with it.

```
Install-Module –Name ImportExcel -Scope CurrentUser
Import-Module -Name ImportExcel

$query = 'SELECT * FROM v$parameter'
$data = Invoke-OraQuery -Connection $connection –Query $query

$excelParams = @{
    Path          = 'parameter.xlsx'
    WorksheetName = 'v$parameter'
    TableStyle    = 'Light18'
    AutoSize      = $true
    FreezeTopRow  = $true
}
$data | Export-Excel @excelParams
```

Excel as a popular data presentation program (II)

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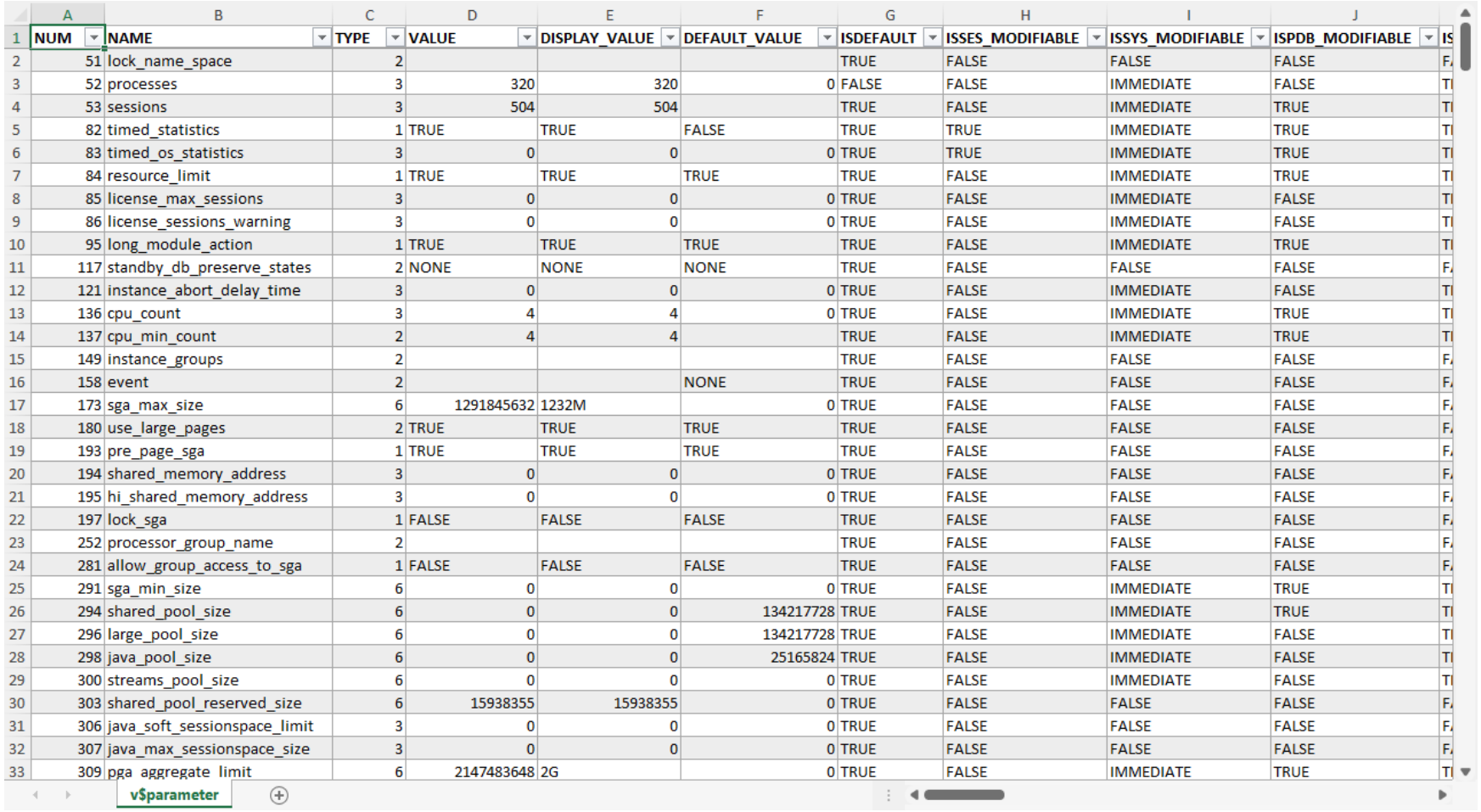

	A	B	C	D	E	F	G	H	I	J	
1	NUM	NAME	TYPE	VALUE	DISPLAY_VALUE	DEFAULT_VALUE	ISDEFAULT	ISSES_MODIFIABLE	ISSYS_MODIFIABLE	ISPDB_MODIFIABLE	IS
2	51	lock_name_space	2				TRUE	FALSE	FALSE	FALSE	F
3	52	processes	3	320	320	0	FALSE	FALSE	IMMEDIATE	FALSE	T
4	53	sessions	3	504	504		TRUE	FALSE	IMMEDIATE	TRUE	T
5	82	timed_statistics	1	TRUE	TRUE	FALSE	TRUE	TRUE	IMMEDIATE	TRUE	T
6	83	timed_os_statistics	3	0	0	0	TRUE	TRUE	IMMEDIATE	TRUE	T
7	84	resource_limit	1	TRUE	TRUE	TRUE	TRUE	FALSE	IMMEDIATE	TRUE	T
8	85	license_max_sessions	3	0	0	0	TRUE	FALSE	IMMEDIATE	FALSE	T
9	86	license_sessions_warning	3	0	0	0	TRUE	FALSE	IMMEDIATE	FALSE	T
10	95	long_module_action	1	TRUE	TRUE	TRUE	TRUE	FALSE	IMMEDIATE	TRUE	T
11	117	standby_db_preserve_states	2	NONE	NONE	NONE	TRUE	FALSE	FALSE	FALSE	F
12	121	instance_abort_delay_time	3	0	0	0	TRUE	FALSE	IMMEDIATE	FALSE	T
13	136	cpu_count	3	4	4	0	TRUE	FALSE	IMMEDIATE	TRUE	T
14	137	cpu_min_count	2	4	4		TRUE	FALSE	IMMEDIATE	TRUE	T
15	149	instance_groups	2				TRUE	FALSE	FALSE	FALSE	F
16	158	event	2			NONE	TRUE	FALSE	FALSE	FALSE	F
17	173	sga_max_size	6	1291845632	1232M	0	TRUE	FALSE	FALSE	FALSE	F
18	180	use_large_pages	2	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	F
19	193	pre_page_sga	1	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	F
20	194	shared_memory_address	3	0	0	0	TRUE	FALSE	FALSE	FALSE	F
21	195	hi_shared_memory_address	3	0	0	0	TRUE	FALSE	FALSE	FALSE	F
22	197	lock_sga	1	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	F
23	252	processor_group_name	2				TRUE	FALSE	FALSE	FALSE	F
24	281	allow_group_access_to_sga	1	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	F
25	291	sga_min_size	6	0	0	0	TRUE	FALSE	IMMEDIATE	TRUE	T
26	294	shared_pool_size	6	0	0	134217728	TRUE	FALSE	IMMEDIATE	TRUE	T
27	296	large_pool_size	6	0	0	134217728	TRUE	FALSE	IMMEDIATE	FALSE	T
28	298	java_pool_size	6	0	0	25165824	TRUE	FALSE	IMMEDIATE	FALSE	T
29	300	streams_pool_size	6	0	0	0	TRUE	FALSE	IMMEDIATE	FALSE	T
30	303	shared_pool_reserved_size	6	15938355	15938355	0	TRUE	FALSE	FALSE	FALSE	F
31	306	java_soft_sessionspace_limit	3	0	0	0	TRUE	FALSE	FALSE	FALSE	F
32	307	java_max_sessionspace_size	3	0	0	0	TRUE	FALSE	FALSE	FALSE	F
33	309	pga_aggregate_limit	6	2147483648	2G	0	TRUE	FALSE	IMMEDIATE	TRUE	T

v$parameter

Excel as a popular data presentation program (III)

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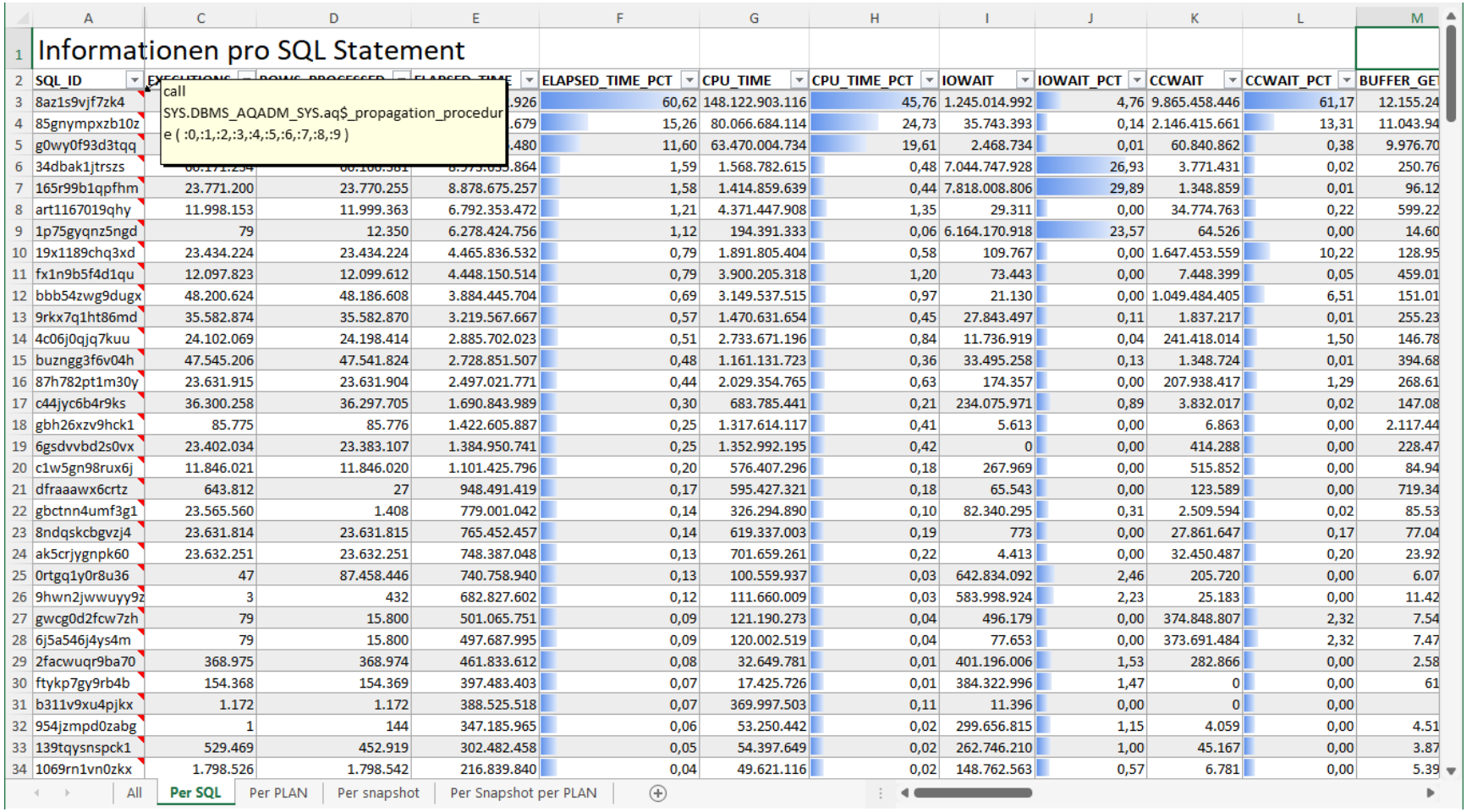

Informationen pro SQL Statement

SQL_ID	EXECUTIONS	ROWS_PROCESSED	ELAPSED_TIME	ELAPSED_TIME_PCT	CPU_TIME	CPU_TIME_PCT	IOWAIT	IOWAIT_PCT	CCWAIT	CCWAIT_PCT	BUFFER_GET
8az1s9vjf7zk4			.926	60,62	148.122.903.116	45,76	1.245.014.992	4,76	9.865.458.446	61,17	12.155.24
85gnympxzb10z			.679	15,26	80.066.684.114	24,73	35.743.393	0,14	2.146.415.661	13,31	11.043.94
g0wy0f93d3tqq			.480	11,60	63.470.004.734	19,61	2.468.734	0,01	60.840.862	0,38	9.976.70
34dbak1jtrszs			.864	1,59	1.568.782.615	0,48	7.044.747.928	26,93	3.771.431	0,02	250.76
165r99b1qpfhm	23.771.200	23.770.255	8.878.675.257	1,58	1.414.859.639	0,44	7.818.008.806	29,89	1.348.859	0,01	96.12
art1167019qhy	11.998.153	11.999.363	6.792.353.472	1,21	4.371.447.908	1,35	29.311	0,00	34.774.763	0,22	599.22
1p75gyqnz5ngd	79	12.350	6.278.424.756	1,12	194.391.333	0,06	6.164.170.918	23,57	64.526	0,00	14.60
19x1189chq3xd	23.434.224	23.434.224	4.465.836.532	0,79	1.891.805.404	0,58	109.767	0,00	1.647.453.559	10,22	128.95
fx1n9b5f4d1qu	12.097.823	12.099.612	4.448.150.514	0,79	3.900.205.318	1,20	73.443	0,00	7.448.399	0,05	459.01
bbb54zwg9dugx	48.200.624	48.186.608	3.884.445.704	0,69	3.149.537.515	0,97	21.130	0,00	1.049.484.405	6,51	151.01
9rkx7q1ht86md	35.582.874	35.582.870	3.219.567.667	0,57	1.470.631.654	0,45	27.843.497	0,11	1.837.217	0,01	255.23
4c06j0qjq7kuu	24.102.069	24.198.414	2.885.702.023	0,51	2.733.671.196	0,84	11.736.919	0,04	241.418.014	1,50	146.78
buzngg3f6v04h	47.545.206	47.541.824	2.728.851.507	0,48	1.161.131.723	0,36	33.495.258	0,13	1.348.724	0,01	394.68
87h782pt1m30y	23.631.915	23.631.904	2.497.021.771	0,44	2.029.354.765	0,63	174.357	0,00	207.938.417	1,29	268.61
c44jyc6b4r9ks	36.300.258	36.297.705	1.690.843.989	0,30	683.785.441	0,21	234.075.971	0,89	3.832.017	0,02	147.08
gbh26xzv9hck1	85.775	85.776	1.422.605.887	0,25	1.317.614.117	0,41	5.613	0,00	6.863	0,00	2.117.44
6gsdvvbd2s0vx	23.402.034	23.383.107	1.384.950.741	0,25	1.352.992.195	0,42	0	0,00	414.288	0,00	228.47
c1w5gn98rux6j	11.846.021	11.846.020	1.101.425.796	0,20	576.407.296	0,18	267.969	0,00	515.852	0,00	84.94
dfraaawx6crtz	643.812	27	948.491.419	0,17	595.427.321	0,18	65.543	0,00	123.589	0,00	719.34
gbctnn4umf3g1	23.565.560	1.408	779.001.042	0,14	326.294.890	0,10	82.340.295	0,31	2.509.594	0,02	85.53
8ndqskcbgvzj4	23.631.814	23.631.815	765.452.457	0,14	619.337.003	0,19	773	0,00	27.861.647	0,17	77.04
ak5crjygnpk60	23.632.251	23.632.251	748.387.048	0,13	701.659.261	0,22	4.413	0,00	32.450.487	0,20	23.92
0rtgq1y0r8u36	47	87.458.446	740.758.940	0,13	100.559.937	0,03	642.834.092	2,46	205.720	0,00	6.07
9hwn2jwwuyy92	3	432	682.827.602	0,12	111.660.009	0,03	583.998.924	2,23	25.183	0,00	11.42
gwcg0d2fcw7zh	79	15.800	501.065.751	0,09	121.190.273	0,04	496.179	0,00	374.848.807	2,32	7.54
6j5a546j4ys4m	79	15.800	497.687.995	0,09	120.002.519	0,04	77.653	0,00	373.691.484	2,32	7.47
2facwuqr9ba70	368.975	368.974	461.833.612	0,08	32.649.781	0,01	401.196.006	1,53	282.866	0,00	2.58
ftykp7gy9rb4b	154.368	154.369	397.483.403	0,07	17.425.726	0,01	384.322.996	1,47	0	0,00	61
b311v9xu4pjkx	1.172	1.172	388.525.518	0,07	369.997.503	0,11	11.396	0,00	0	0,00	
954jzmpd0zabg	1	144	347.185.965	0,06	53.250.442	0,02	299.656.815	1,15	4.059	0,00	4.51
139tqysnspck1	529.469	452.919	302.482.458	0,05	54.397.649	0,02	262.746.210	1,00	45.167	0,00	3.87
1069rn1vn0zkx	1.798.526	1.798.542	216.839.840	0,04	49.621.116	0,02	148.762.563	0,57	6.781	0,00	5.39

call
SYS.DBMS_AQADM_SYS.aq$_propagation_procedur
e (:0,:1,:2,:3,:4,:5,:6,:7,:8,:9)

All | Per SQL | Per PLAN | Per snapshot | Per Snapshot per PLAN

Excel as a popular data presentation program (IV)

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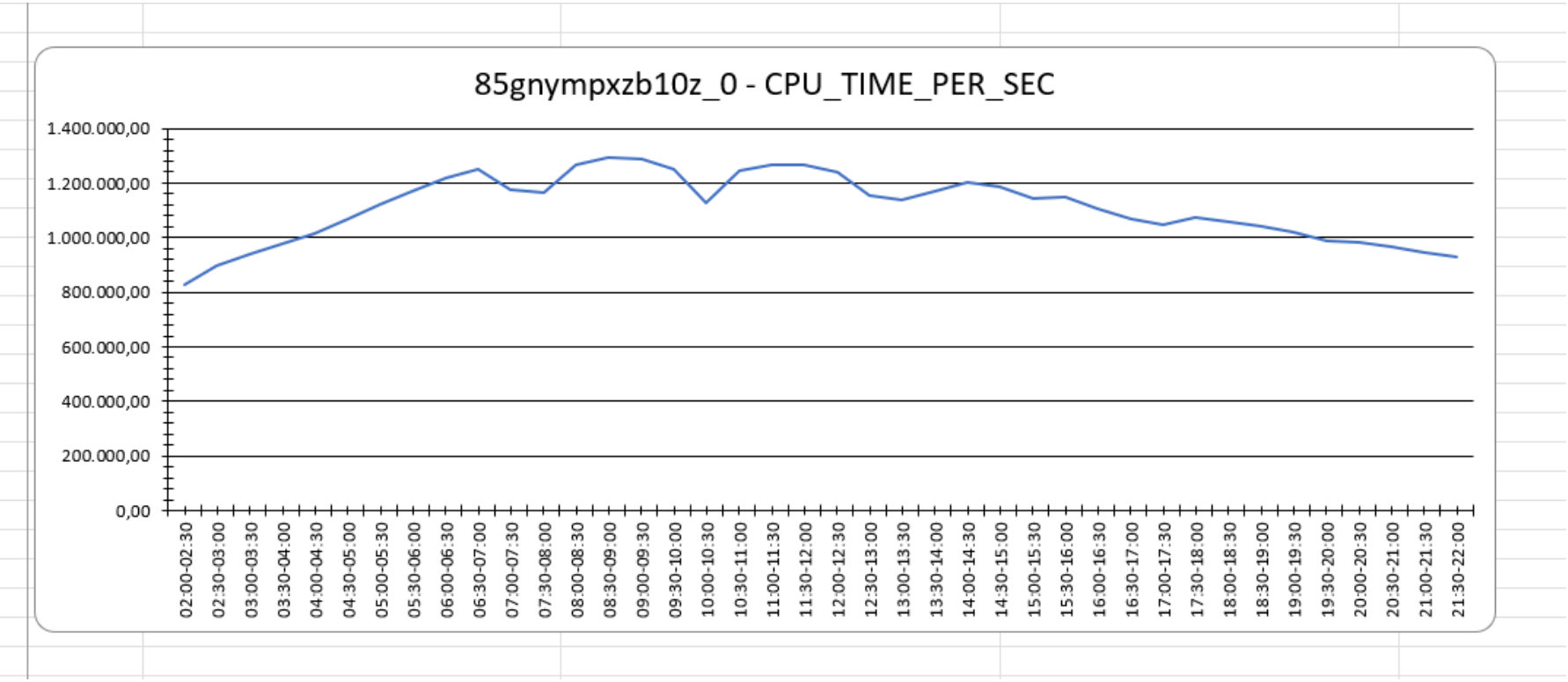

What else could I talk about?

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- Storage of data in JSON format
- Processing CLOBs
- Using bind variables
- PowerShell as an ETL tool
- …

https://github.com/andreasjordan/PowerShell-for-DBAs/tree/main/DOAG2022

Thank you for your attention

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Zentrale Paderborn
Karl-Schurz-Straße 19a
33100 Paderborn
Tel.: 05251 1063-0
Fax: 0180 1 67349 0

Seminarzentrum Wiesbaden
Kreuzberger Ring 13
65205 Wiesbaden
Tel.: 0611 77840-00

info@ordix.de
https://www.ordix.de/