

Christophe LAPORTE

MVP Data Platform

SQL Server MCM / MCSM



Les bases du dépannage

Christophe LAPORTE



- Audit
- Conseil
 - Infrastructure / Architecture
 - Virtualisation / Cloud
 - Haute disponibilité
 - Performance / Optimisation
 - Dépannage / Migrations
- Formations
- Remote DBA
- Hébergement BDD

Thank you Sponsors



You are Community

Agenda

Fonctionnement de SQL Server

Wait and Queues

DMVs & DMFs

Compteurs de performance

Outils



Apologies

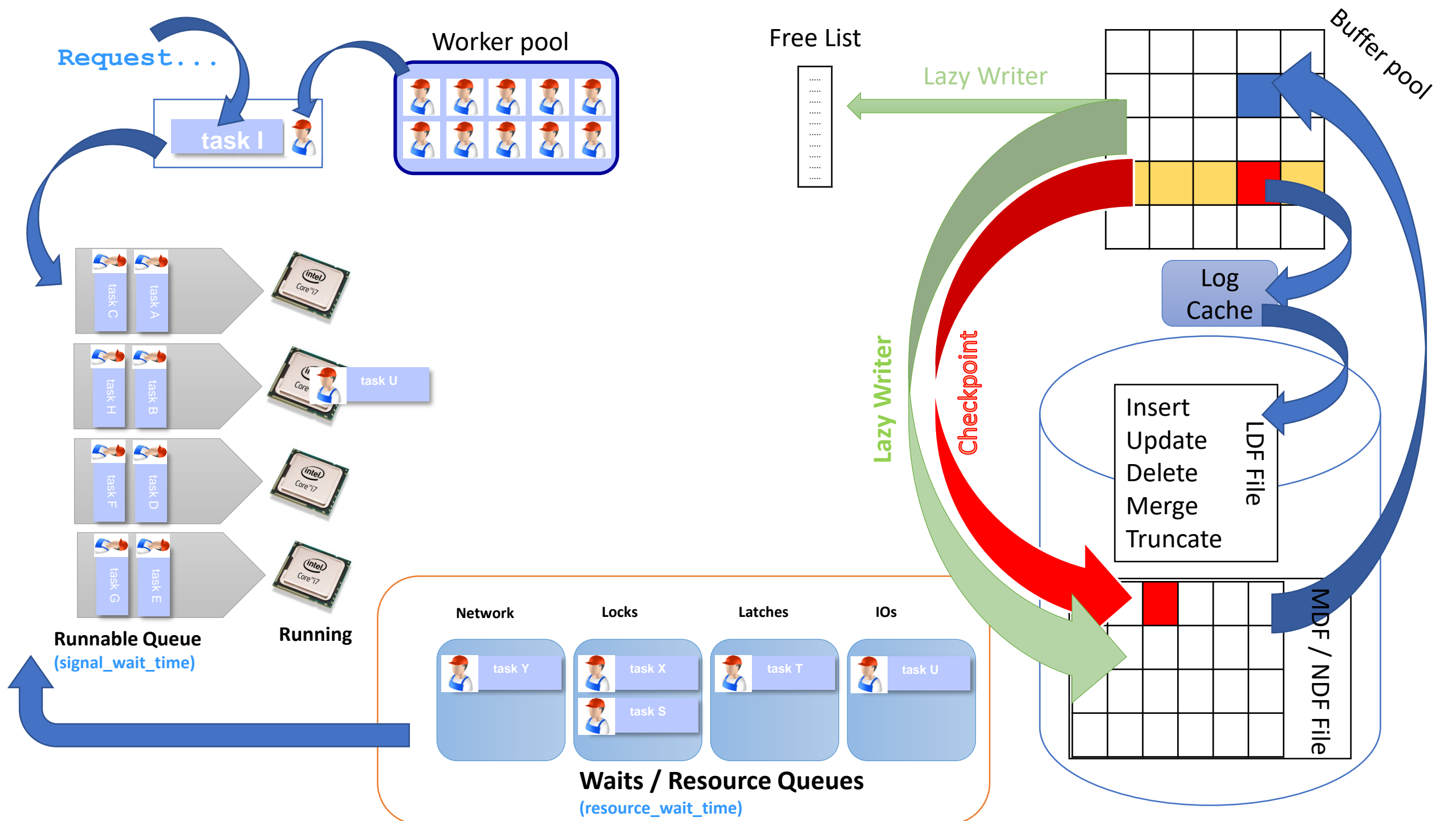
J'ai bien
prévenu
n'étant
introduction ??

Ils vont me
détester !

Bien qu'il s'agisse d'une introduction,
Il y a beaucoup de choses à voir !

A large, stylized teal graphic on the left side of the slide, resembling a thick, curved arrow pointing towards the right. It has a layered, ribbon-like appearance.

Fonctionnement de SQL Server



A large, stylized teal graphic on the left side of the slide, resembling a thick, curved arrow or a stylized letter 'C' that points towards the right.

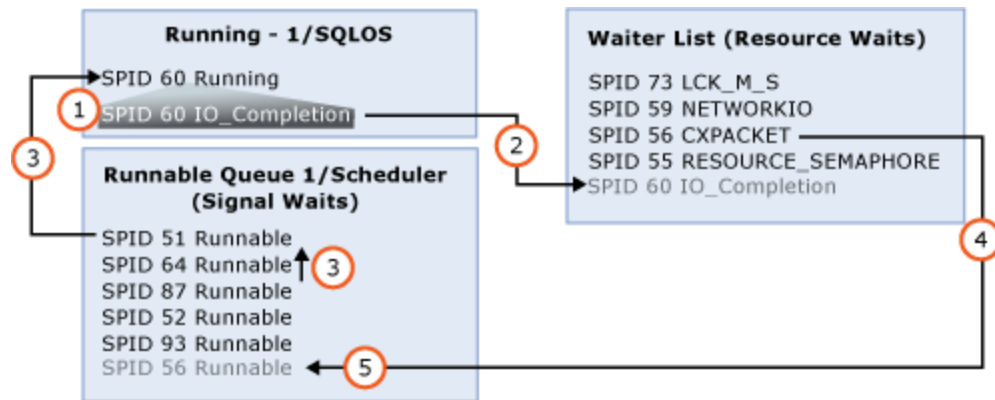
Waits and Queues

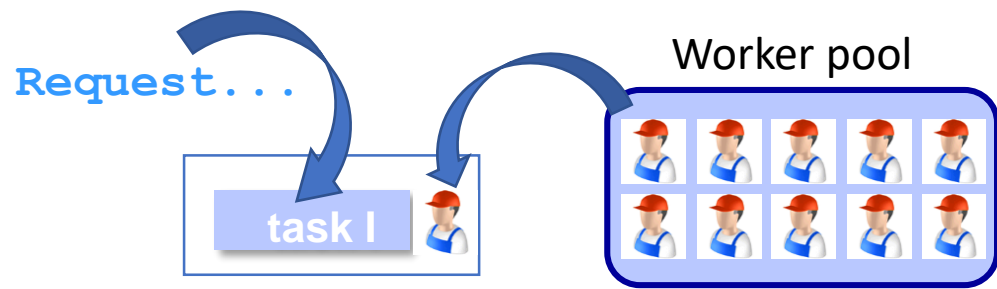
"Technique" wait and queues

DMVs / DMFs

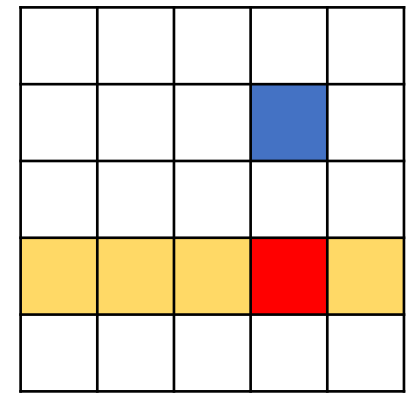
sys.dm_os_wait_stats

sys.dm_os_waiting_stats





Free List



Buffer pool

Log
Cache

sys.dm_os_waiting_tasks
sys.dm_os_wait_stats

Insert
Update
Delete
Merge
Truncate

LDF File

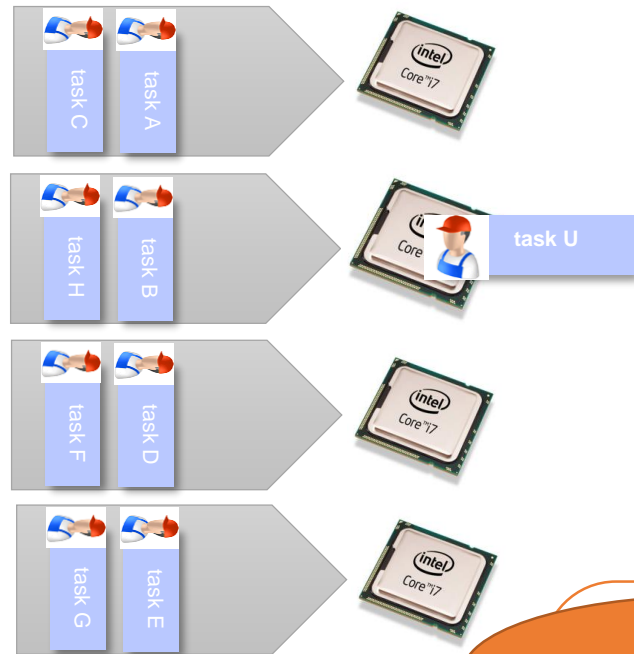
MDF / NDF File

Runnable Queue
(signal_wait_time)

Runni

DBCC SQLPERF ('sys.dm_os_wait_stats', CLEAR);

Waits / Resource Queues
(resource_wait_time)

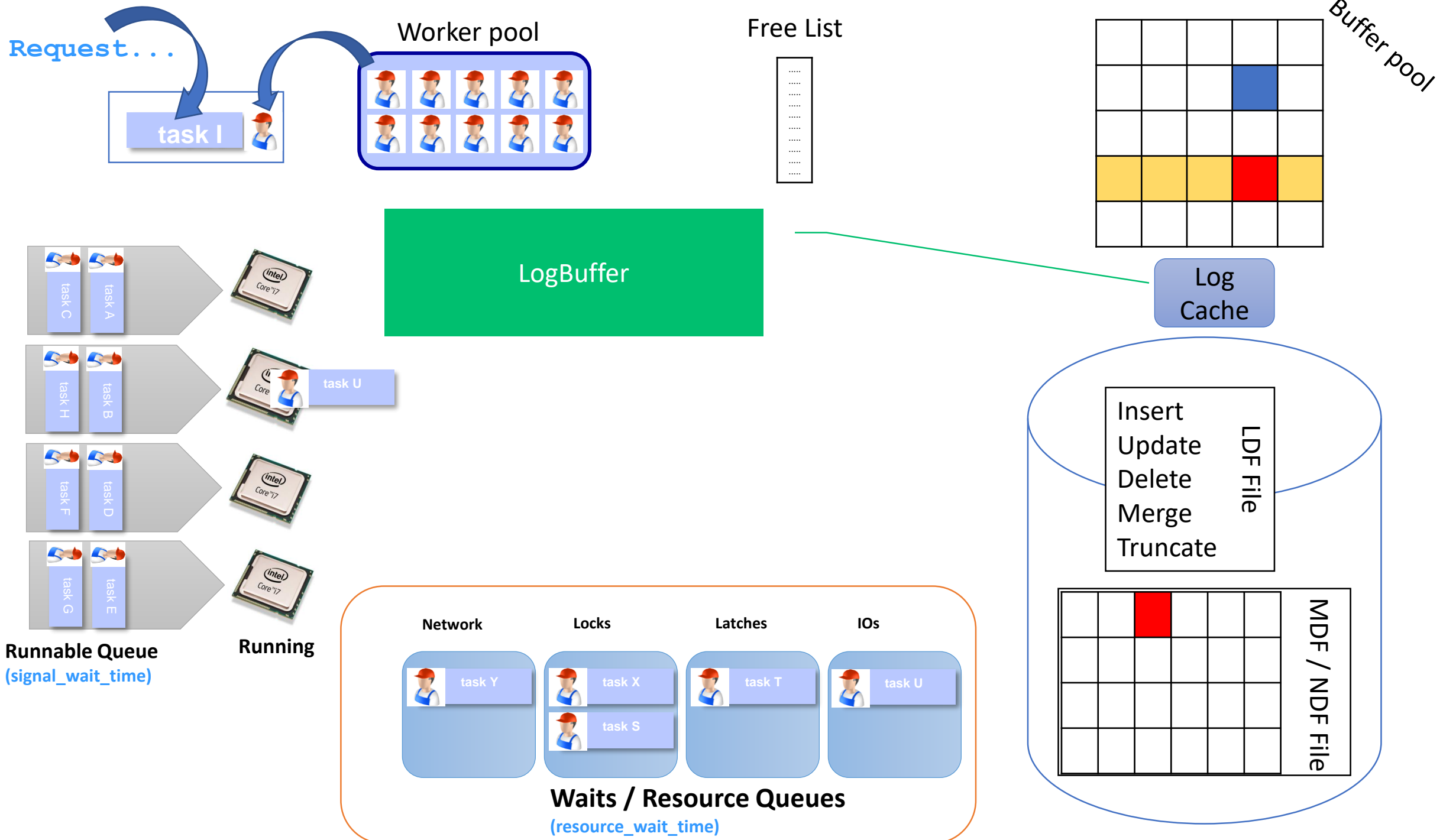


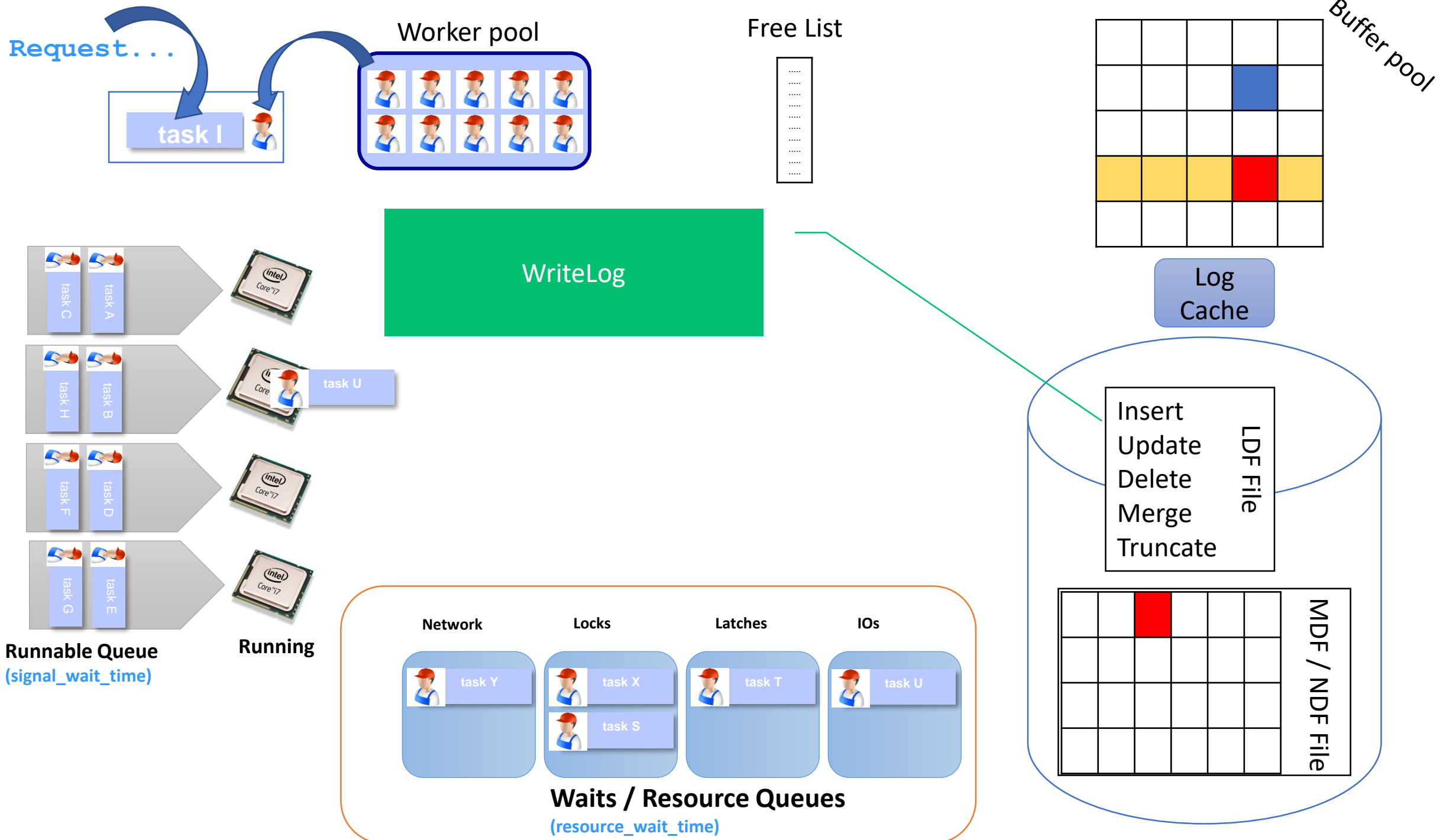
Attentes les plus fréquentes

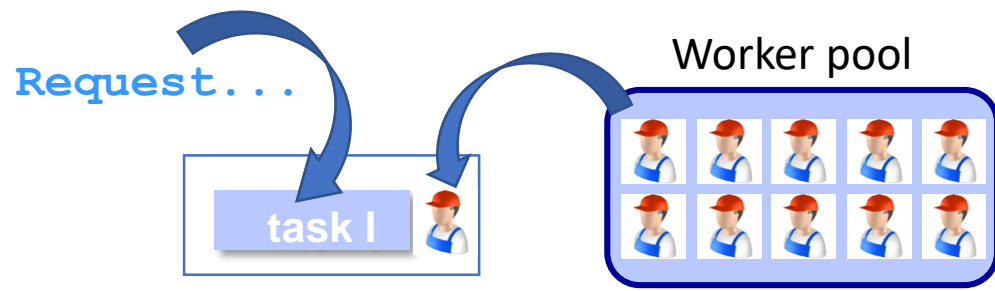
Majeure partie du troubleshooting basée sur les attentes
Interprétation basée sur des pourcentages

WaitType	Wait_Sec	Resource_Sec	Signal_Sec	Wait Count	Wait Percentage
OLED	42284.37	42284.37	0.00	2243385801	32.16
ASYNC_IO_COMPLETION	14996.42	14996.02	0.41	1730	11.41
BACKUPBUFFER	14563.56	14010.49	553.07	11753930	11.08
BACKUPIO	13811.04	13768.30	42.74	4242444	10.50
PAGEIOLATCH_SH	11954.69	11864.22	90.46	19529888	9.09
ASYNC_NETWORK_IO	8717.07	7564.87	1152.20	26038151	6.63
WRITELOG	7599.80	7306.75	293.04	7155355	5.78
PAGEIOLATCH_EX	3380.40	3343.49	36.91	6031488	2.57
SOS_SCHEDULER_YIELD	2983.83	53.80	2930.03	42931635	2.27
IO_COMPLETION	2434.85	2378.08	56.77	9309193	1.85
LCK_M_S	1405.47	1405.10	0.38	4145	1.07
CXPACKET	1267.15	1061.68	205.47	776636	0.96
PAGELATCH_EX	1178.21	220.11	958.10	44701780	0.90
PREEMPTIVE_OS_WAITFORSINGLEOBJECT	865.75	865.75	0.00	1652795	0.66
LCK_M_U	831.89	830.83	1.07	6481	0.63
PREEMPTIVE_OS_AUTHENTICATIONOPS	729.00	729.00	0.00	2228039	0.55
PAGELATCH_SH	401.81	76.26	325.55	8406443	0.31
BACKUPTHREAD	278.67	277.83	0.83	15643	0.21
PREEMPTIVE_OS_ENCRYPTMESSAGE	187.08	187.08	0.00	2994534	0.14
LATCH_EX	173.83	131.52	42.30	318613	0.13
LCK_M_SCH_S	133.26	128.30	4.96	2078	0.10

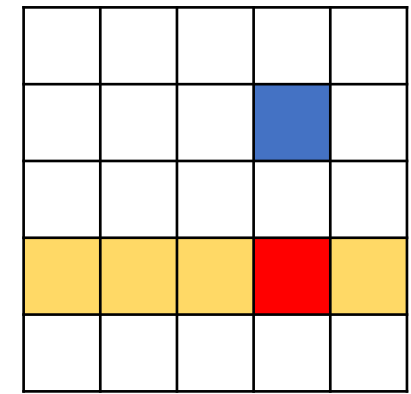
WaitType	Wait_Sec	Resource_Sec	Signal_Sec	Wait Count	Wait Percentage
WRITELOG	10780538.49	10429545.21	350993.29	645164078	75.36
PREEMPTIVE_XE_DISPATCHER	1759175.48	1759175.48	0.00	3	12.30
SOS_SCHEDULER_YIELD	400567.84	301.54	400266.30	236500272	2.80
LCK_M_S	296141.00	295495.85	645.15	710421	2.07
ASYNC_NETWORK_IO	248598.86	248457.49	141.37	215088	1.74
CXPACKET	215274.82	197232.30	18042.52	12754864	1.50
PAGELATCH_EX	91874.66	8171.45	83703.21	244349126	0.64
PAGEIOLATCH_SH	70499.86	70160.77	339.09	2218419	0.49
PAGEIOLATCH_EX	59815.51	59679.20	136.31	452519	0.42
PAGELATCH_SH	56729.54	55900.11	829.43	4624950	0.40
LATCH_EX	56132.49	54915.72	1216.77	3973637	0.39
OLED	34380.91	34380.91	0.00	541608697	0.24
THREADPOOL	31268.20	31268.20	0.00	12997	0.22
PREEMPTIVE_OS_AUTHENTICATIONOPS	23892.92	23892.92	0.00	30931341	0.17
ASYNC_IO_COMPLETION	21195.99	21195.94	0.05	152	0.15
BACKUPBUFFER	17901.11	17434.05	467.06	2633152	0.13





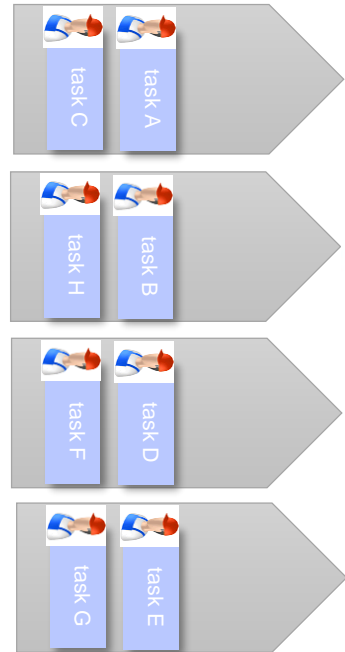


Free List



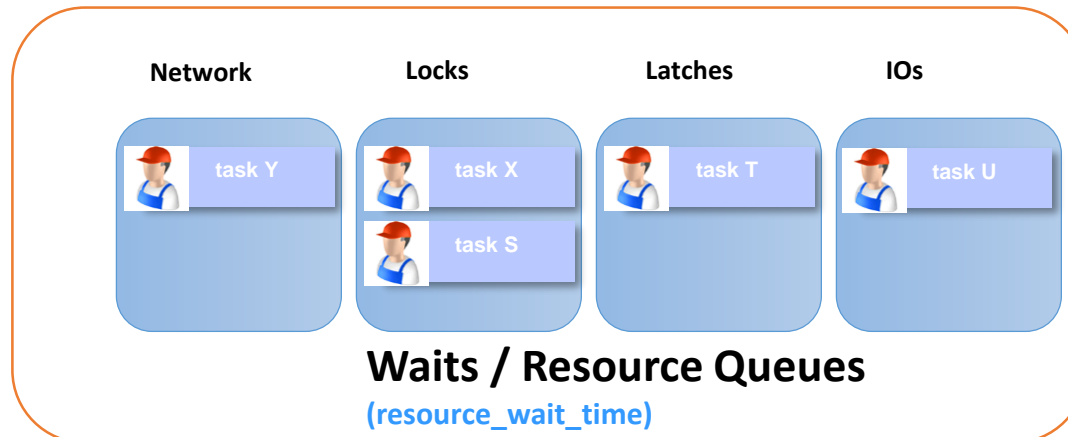
Log
Cache

ASYNC_IO_COMPLETION
IO_COMPLETION (Synchronous)
Read Log (recovery)
Read allocation bitmaps (recovery, restore)
Write TempDB (Merge join, eager spool)



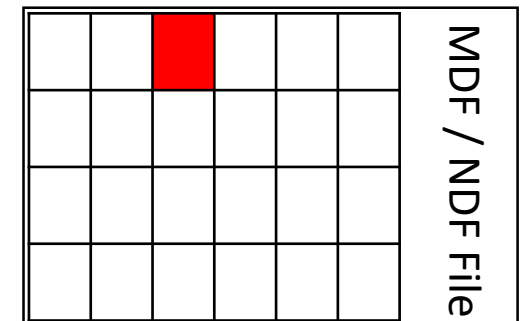
Runnable Queue
(signal_wait_time)

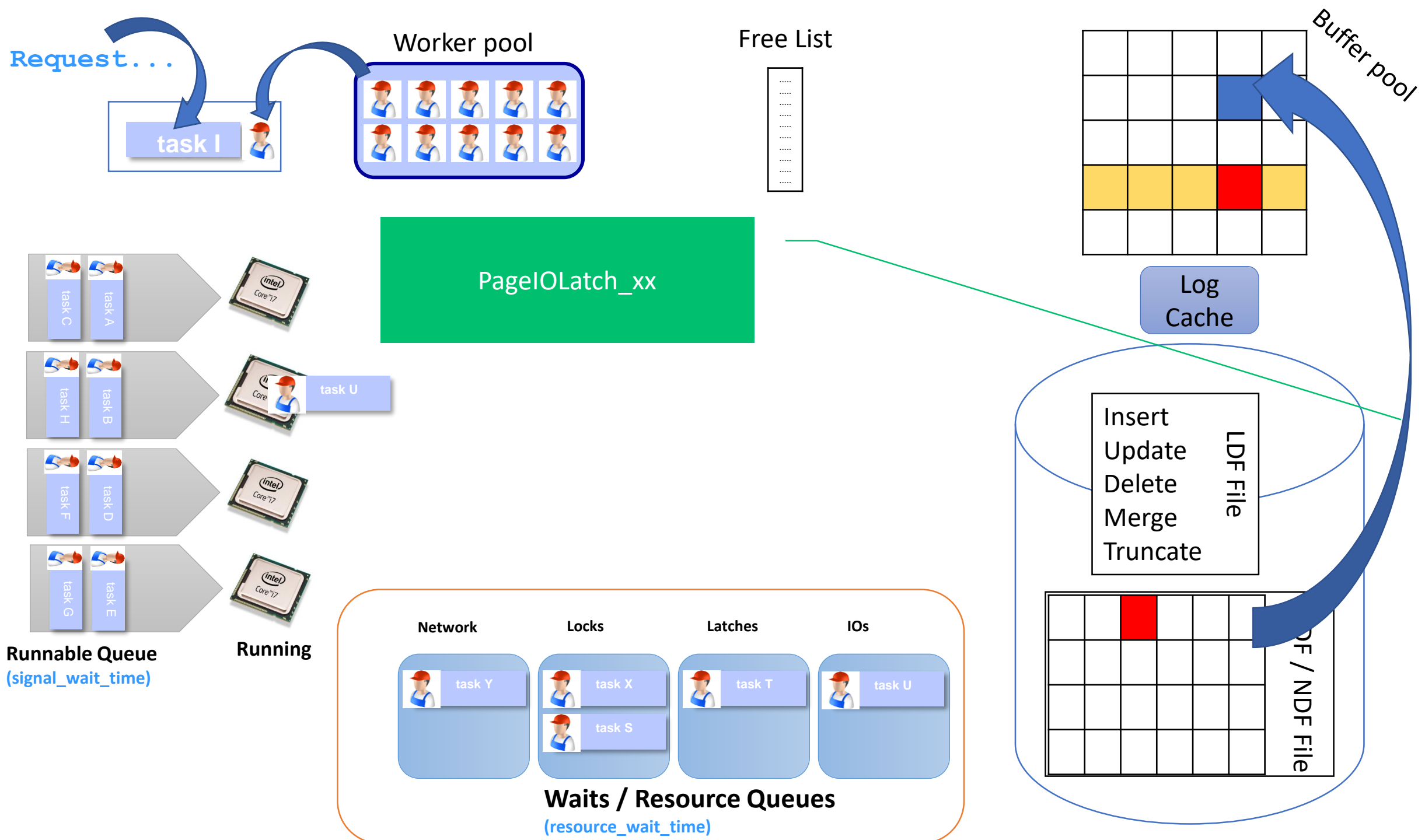
Running

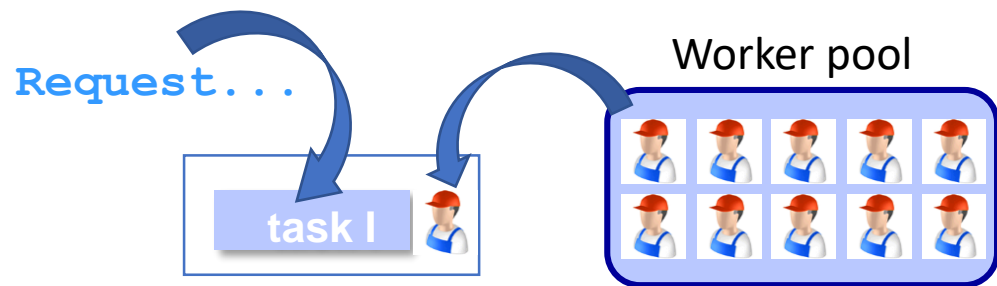


Insert
Update
Delete
Merge
Truncate

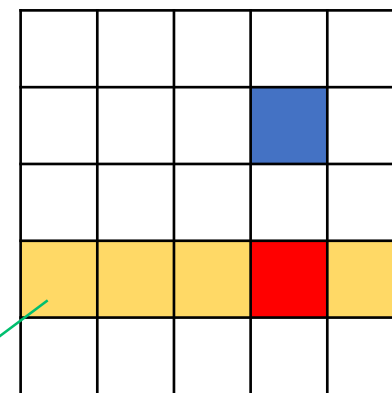
LDF File





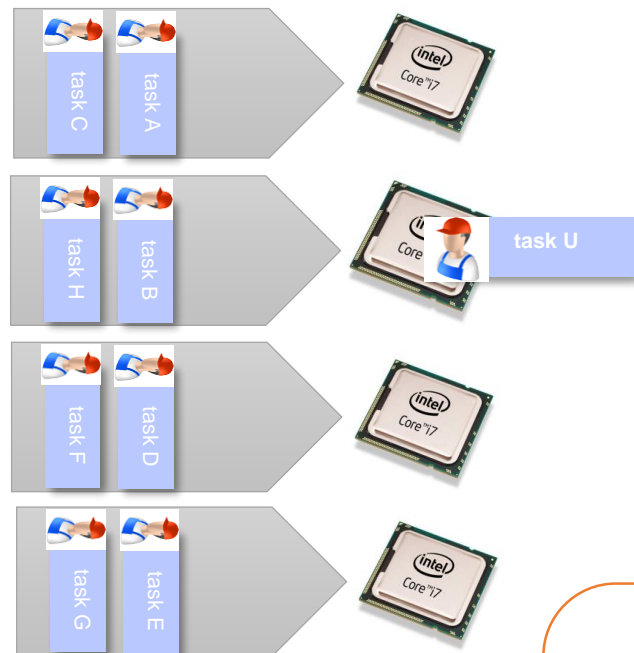


Free List



Buffer pool

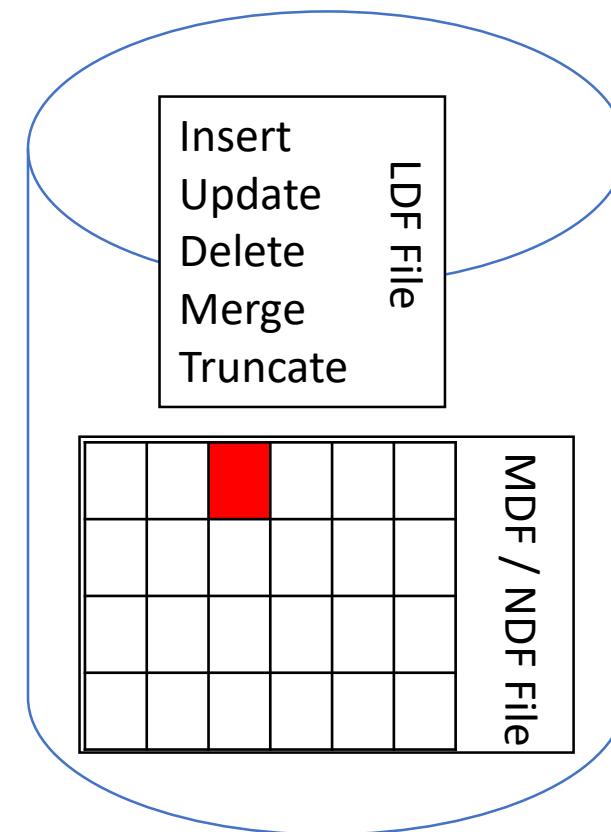
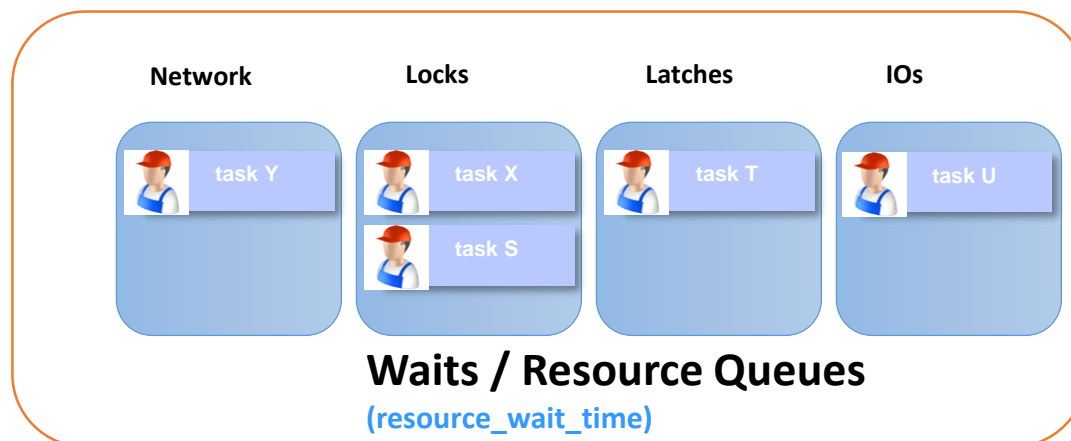
Log
Cache

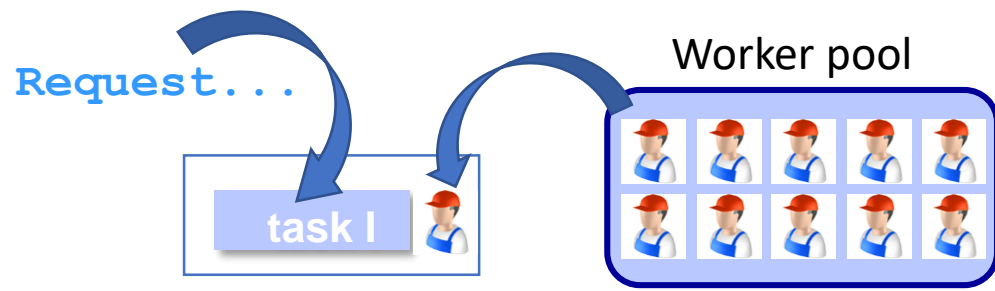


PageLatch
Resource_Semaphore

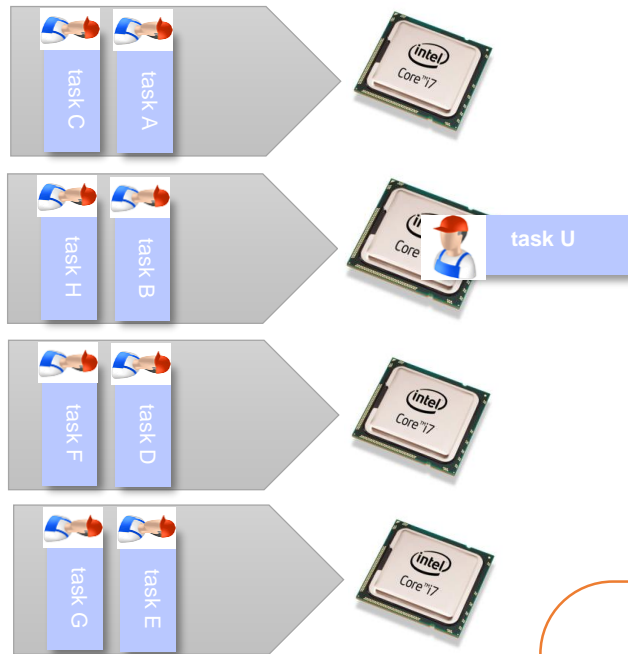
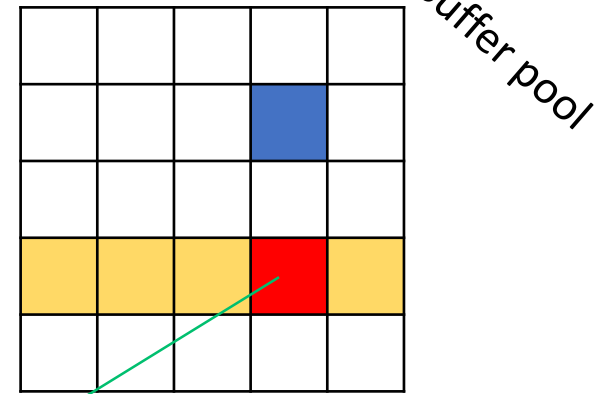
Runnable Queue
(signal_wait_time)

Running





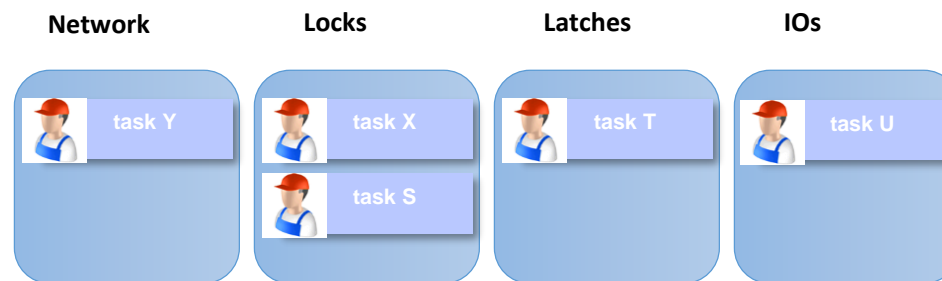
Free List



Runnable Queue
(signal_wait_time)

Running

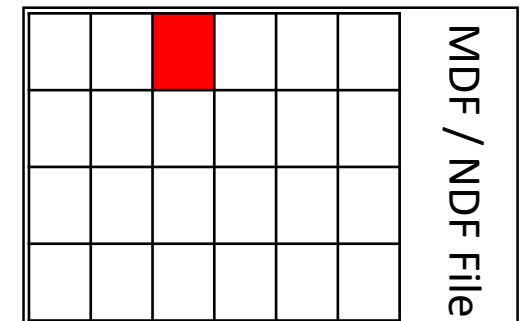
LCK_xxx

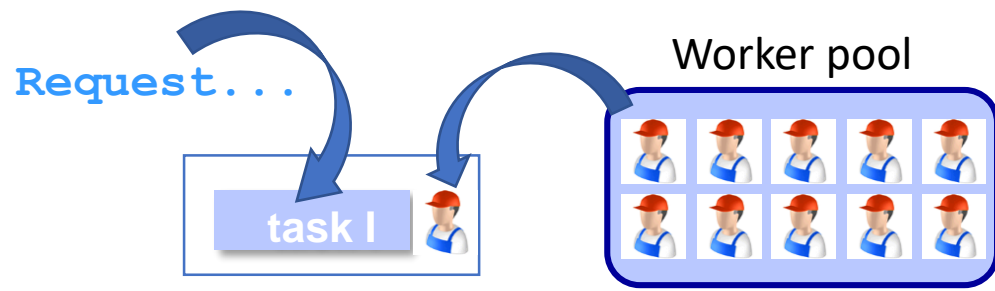


Waits / Resource Queues
(resource_wait_time)

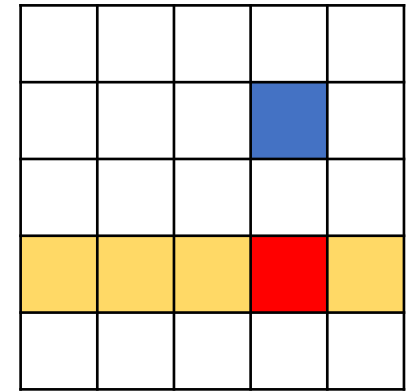
Insert
Update
Delete
Merge
Truncate

LDF File





Free List



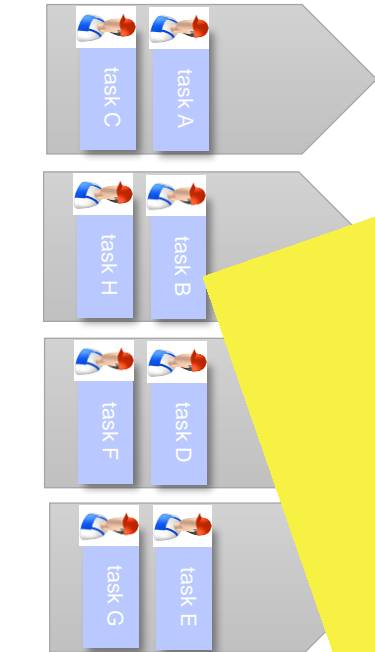
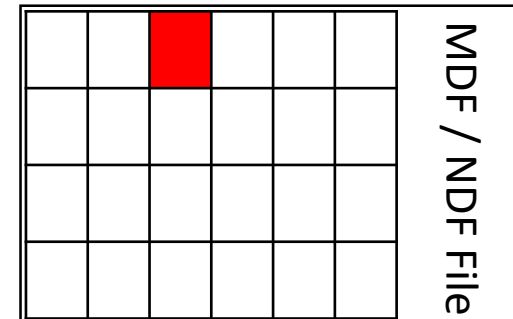
Buffer pool

Log
Cache

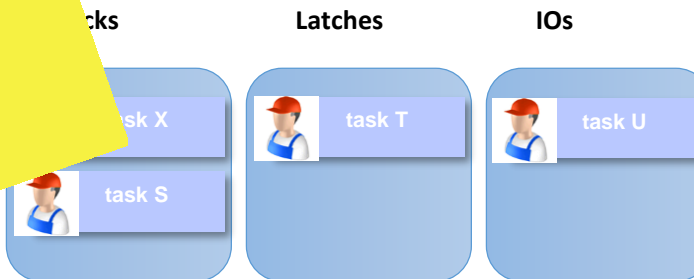
SOS_Scheduler_Yield
CXPacket

Insert
Update
Delete
Merge
Truncate

LDF File

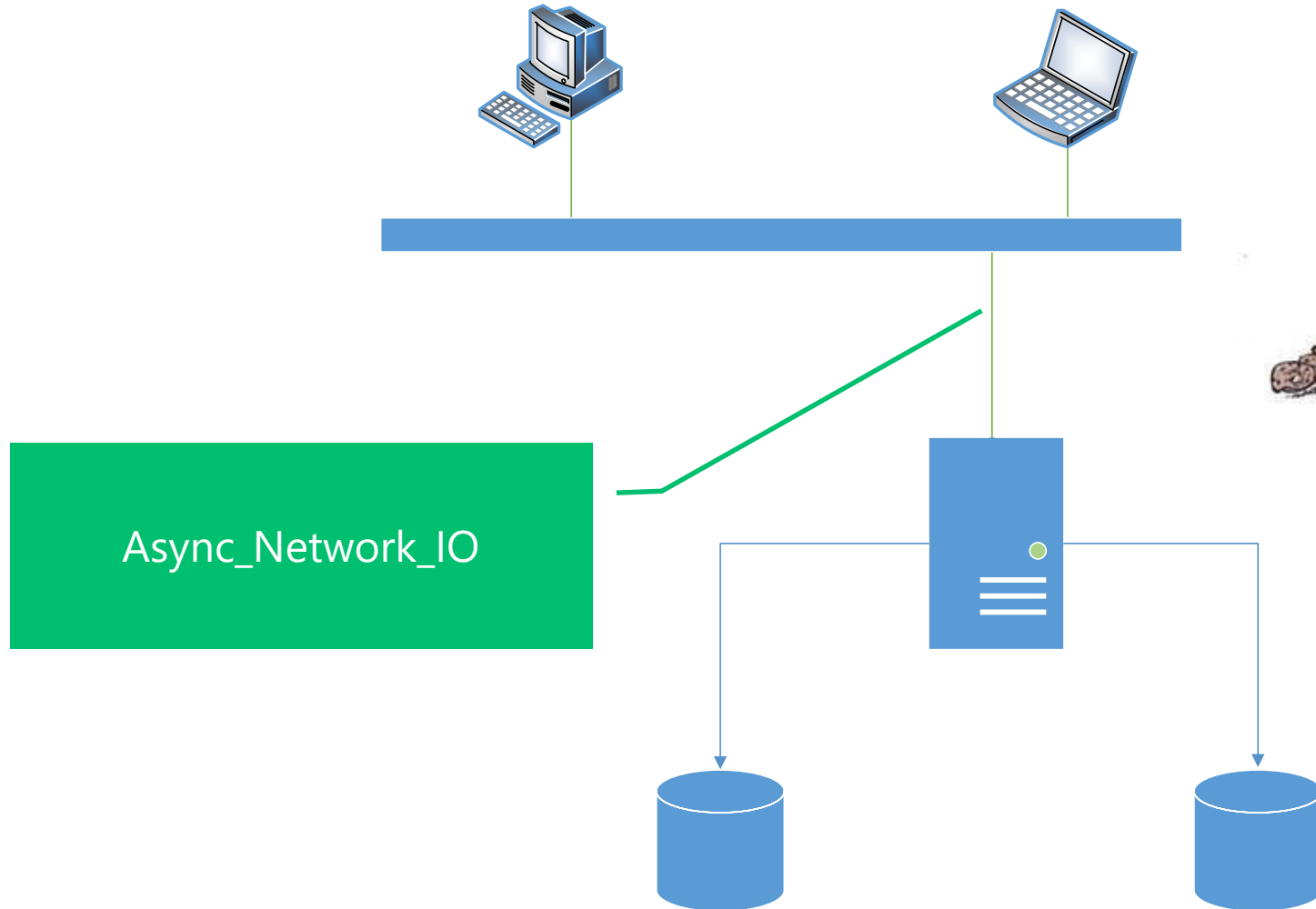


Runnable Queue
(signal_wait_time)



Waits / Resource Queues
(resource_wait_time)

Async_network_io



"Technique" wait and queues

Approche pragmatique

Bibliographie (entre autres)

SQL Server 2005 Waits and Queues (Tom Davidson)

Performance Tuning Using Wait Statistics (Jonathan Kehayias, Erin Stellato)

Performance Tuning With Wait Statistics (Joe Sack)

Description des attentes

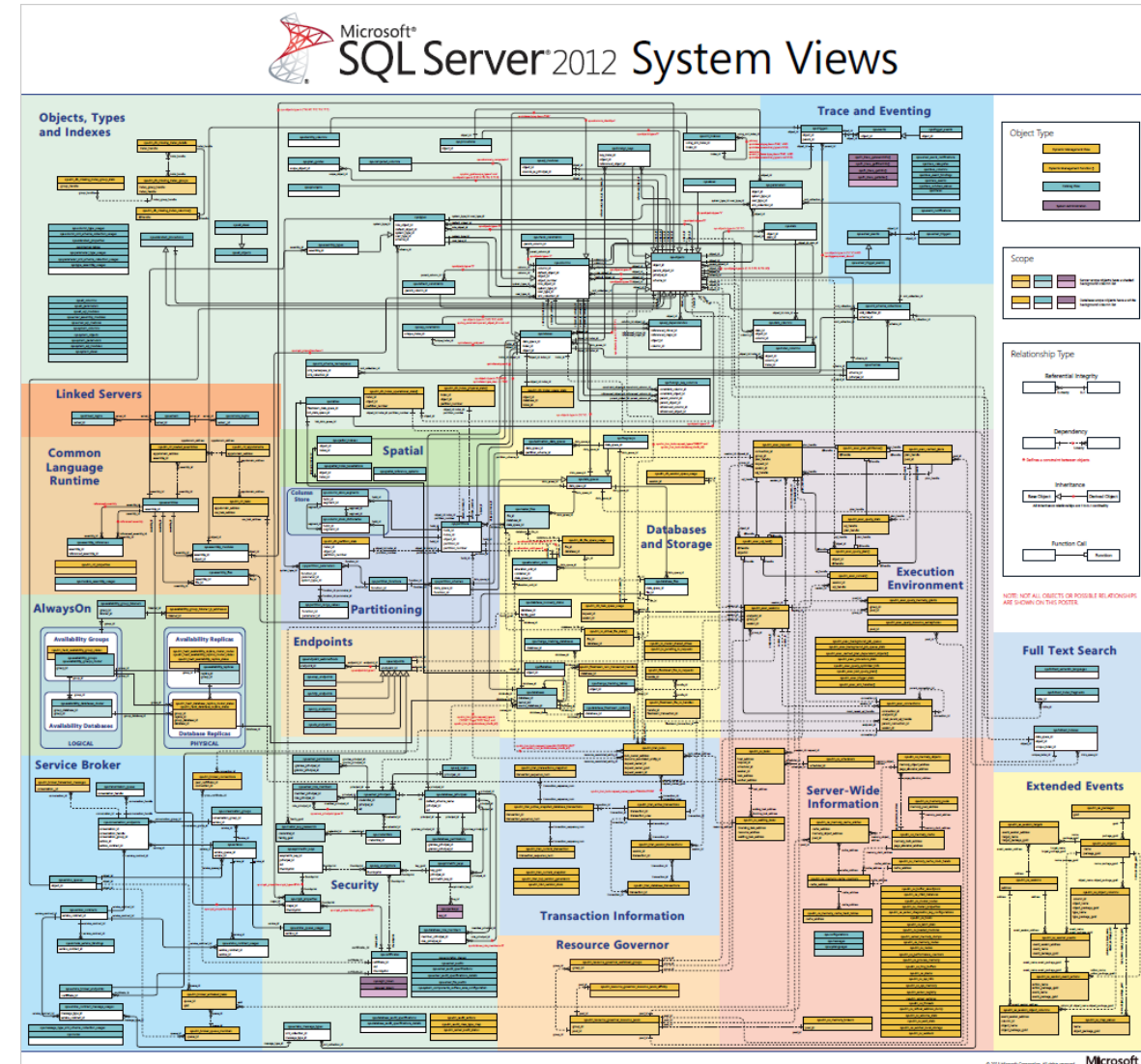
<https://www.sqlskills.com/help/waits/>

A large, stylized teal graphic on the left side of the slide, resembling a thick, curved arrow or a stylized letter 'D' pointing towards the right.

DMVs & DMFs

DMVs et DMFs

Vues et fonctions
Le fonctionnement de SQL Server
Orienté DBA
233 DMVs et DMFs (2016 SP1)



Request...



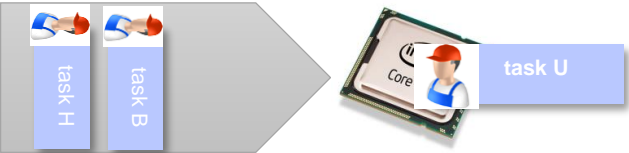
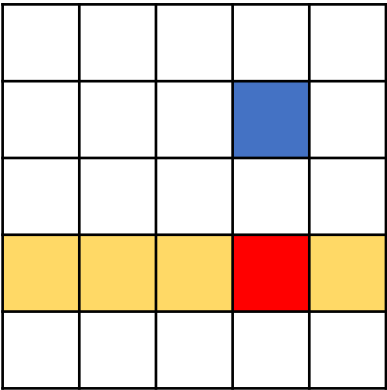
Worker pool



Free List



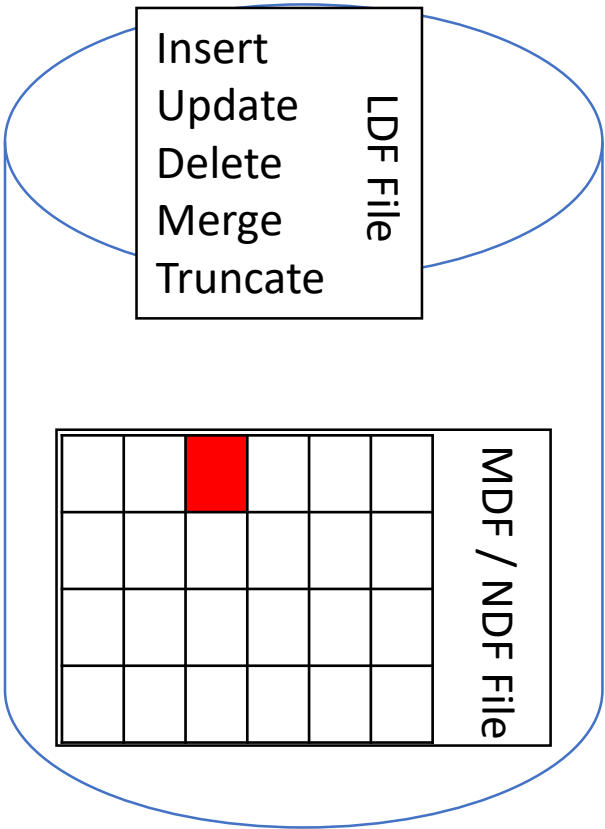
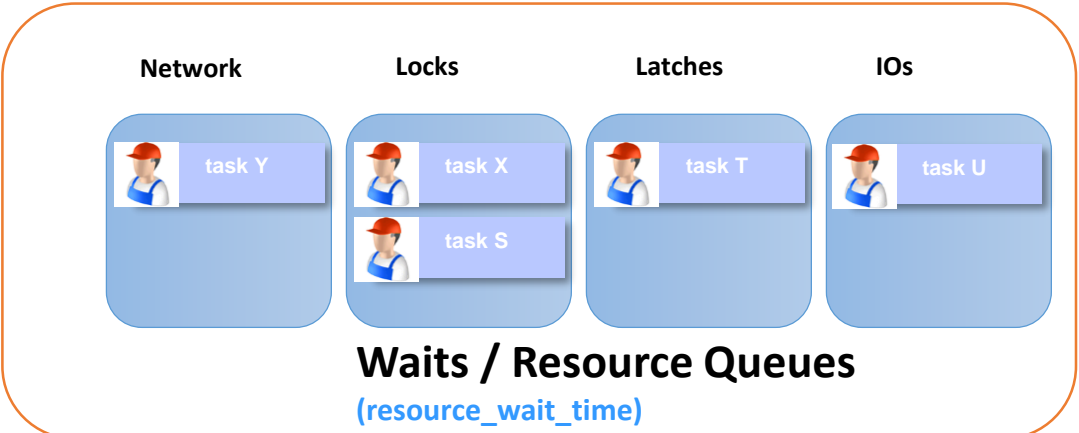
Buffer pool



sys.dm_exec_requests
sys.dm_exec_sessions
sys.dm_exec_connections
sys.dm_exec_sql_text
sys.dm_exec_query_plan
sys.dm_tran_locks

Runnable Queue
(signal_wait_time)

Running



Request...



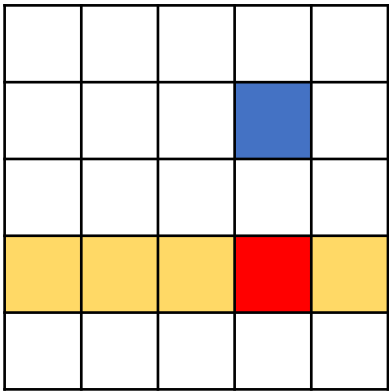
Worker pool



Free List



Buffer pool



Log
Cache

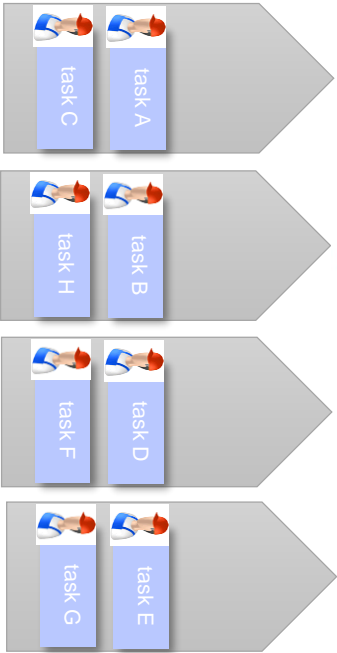
sys.dm_os_schedulers

Insert
Update
Delete
Merge
Truncate

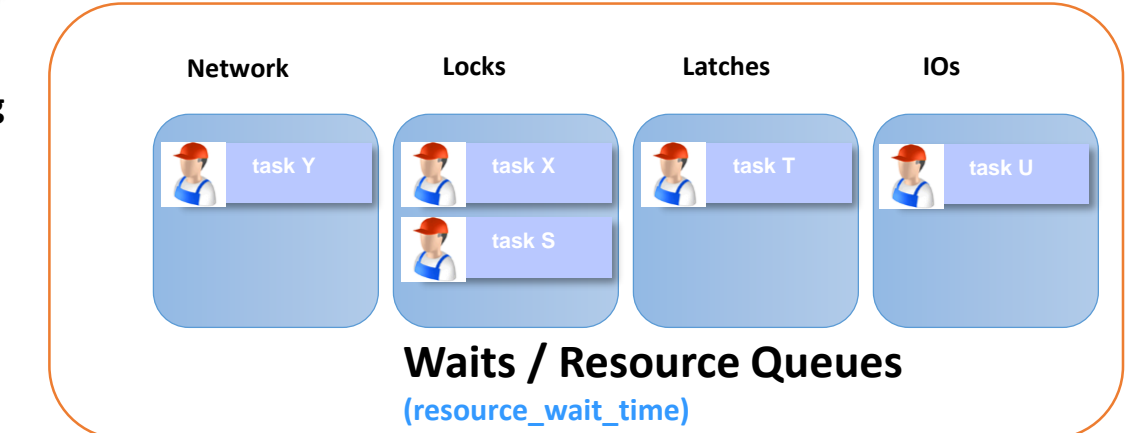
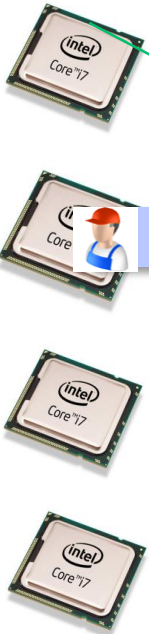
LDF File

MDF / NDF File

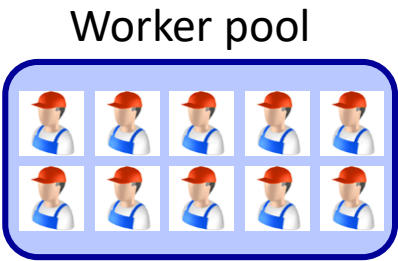
Runnable Queue
(signal_wait_time)



Running



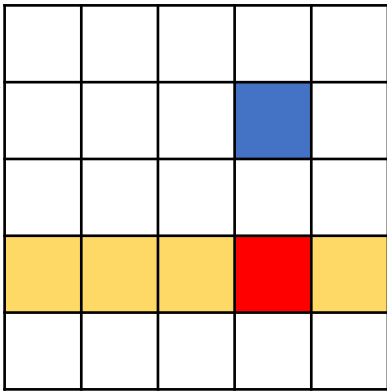
Request...



Free List

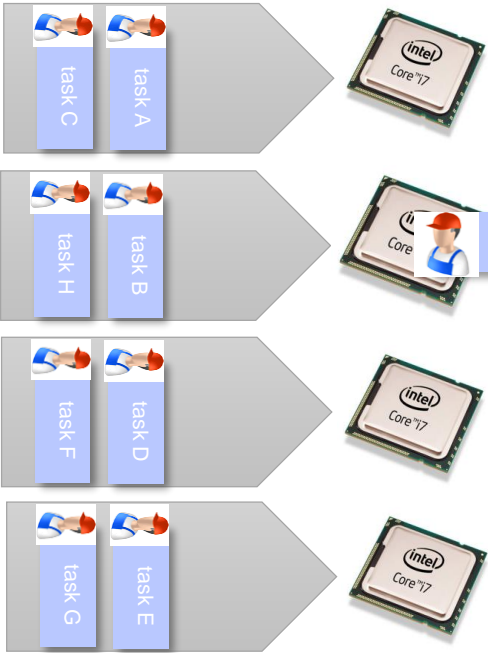


sys.dm_os_buffer_descriptors



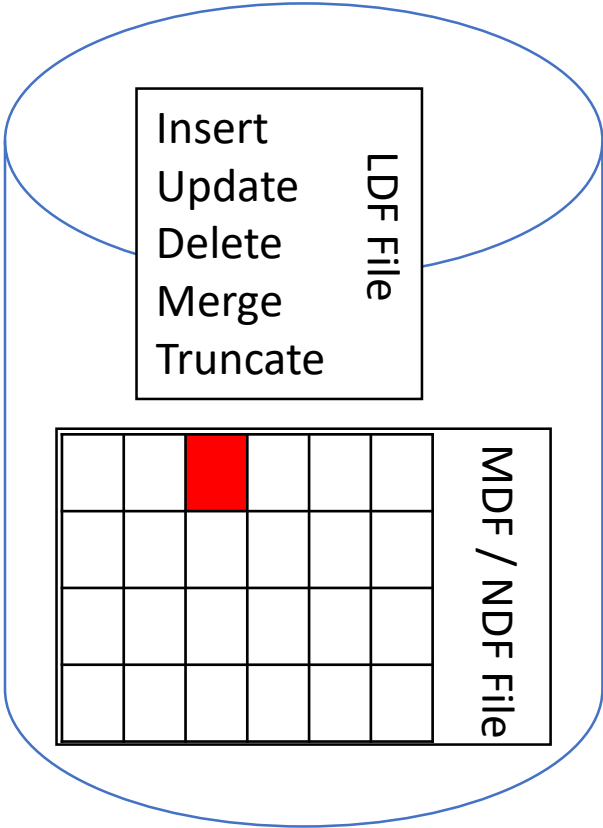
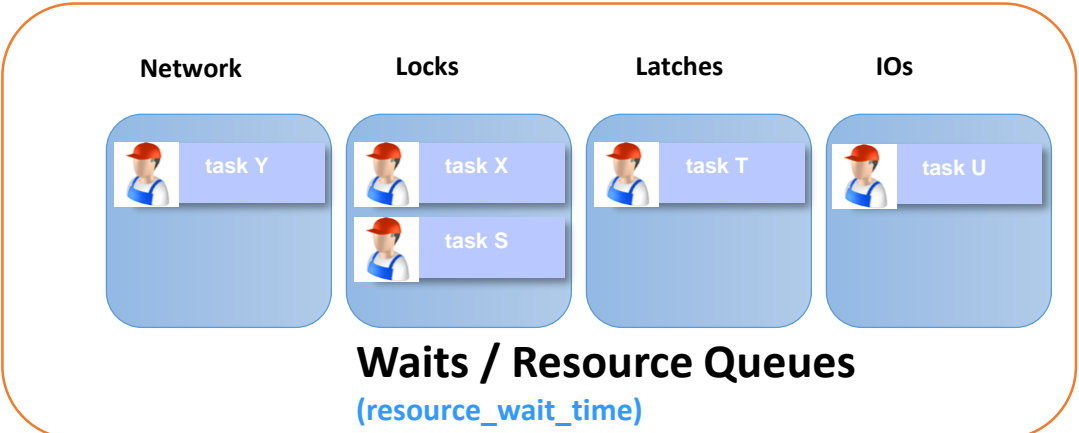
Buffer pool

Log
Cache



Runnable Queue
(signal_wait_time)

Running



Request...



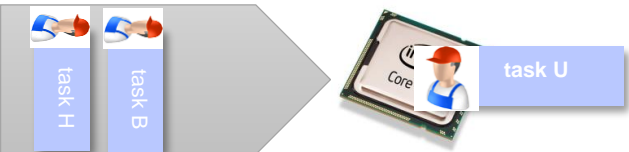
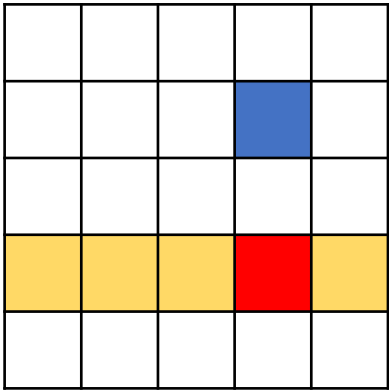
Worker pool



Free List



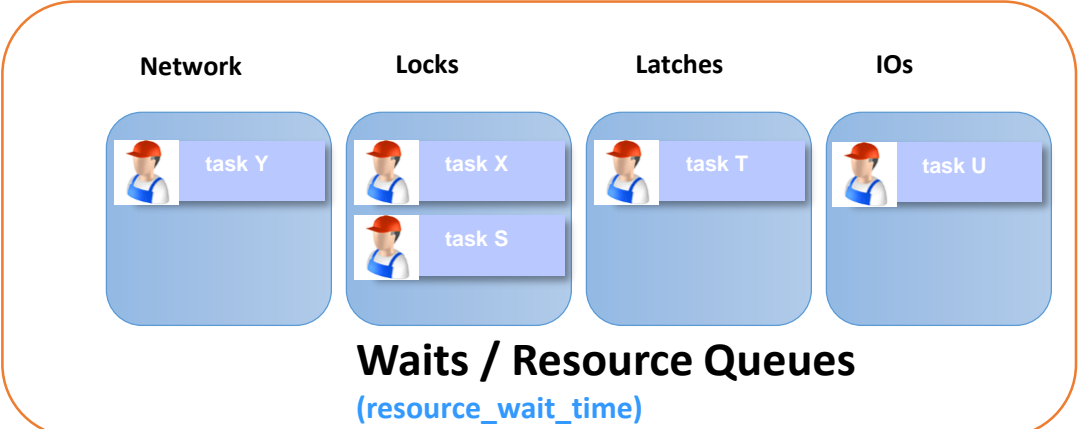
Buffer pool



sys.dm_io_virtual_file_stats
sys.dm_io_pending_io_requests

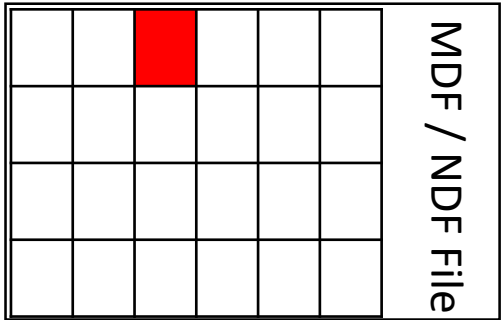
Runnable Queue
(signal_wait_time)

Running



Insert
Update
Delete
Merge
Truncate

LDF File



Sys.dm_db_index_operational_stats

Locks

Latches

Forwarded Fetch (heap)

object_id	index_id	row_lock_count	row_lock_wait_count	row_lock_wait_in_ms
450412974	1	122,930,566	632,877	10,041,545
450412974	3	721,703	10,676	173,883
1013578649	1	14,495,641	216	103,346
32367530	1	16,108	728	84,668
812894313	3	28,610,039	220	18,689
1105035318	9	7,643,439	617	16,183
1840373971	1	39,783,250	374	13,468
812894313	1	37,227,337	39	11,139
1660897334	1	64,004,390	96	9,784
780894199	1	14,300,610	408	6,639
1840373971	164	1,844,072	2	5,039
1004894997	8	350,137	1	3,900
1165559536	1	11,503,501,182	136	3,134
2099902948	1	4,710,401	36	592
131843882	1	149,410	11	188

object_id	index_id	leaf_insert_count	leaf_delete_count	leaf_update_count	leaf_ghost_count	forwarded_fetch_count
645577338	0	226 174	231 897	4 091 359	0	405 325
677577452	0	1 771	0	0	0	54 963

object_id	index_id	row_lock_count	row_lock_wait_count	row_lock_wait_in_ms	page_lock_count	page_lock_wait_count	page_lock_wait_in_ms
904116199	1	153,460	12	175,063,393	151,078	0	0
1897213959	2	13,332,283	13	99,635,110	10,256,388	0	0
1513342193	3	9,533,727	2	33,459,970	7,232,205	0	0
1902407784	2	4,388,757,801	202	10,151,833	122,536,517	46,110	28,786,799
520857418	6	1,672	1	2,001,204	1,607	0	0
639809837	4	57,610,644	223	1,397,563	3,134,053	0	0

Sys.dm_db_index_usage_stats

Reads vs Writes

Index les plus utilisés

Index "inutiles"

object_id ▼	index_id ▼	user_scans ▼	user_seeks ▼	user_lookups ▼	user_read ▼	user_updates ▼
1840373971	17	0	0	0	0	812,453,385
1840373971	18	0	0	0	0	62,707,474
1004894997	12	0	0	0	0	28,006,915
1840373971	110	0	0	0	0	21,069,789
1105035318	10	0	0	0	0	15,059,636
1105035318	7	0	0	0	0	15,059,636
1105035318	28	0	0	0	0	15,059,636
1105035318	8	0	0	0	0	14,653,046
1105035318	41	0	0	0	0	14,570,448
1105035318	42	0	0	0	0	14,570,402
1105035318	2	0	0	0	0	14,570,402

Sys.dm_db_index_physical_stats

Fragmentation

object_id ▼	index_id ▼	index_type_desc ▼	avg_fragmentation_in_percent ▼	fragment_count ▼	page_count ▼	fill_factor ▼	has_filter ▼	filter_definition ▼
645577338	0	HEAP	82,04667864	918	8876	0	0	NULL
1029578706	1	CLUSTERED INDEX	18,12574316	2600	13456	0	0	NULL
1141579105	1	CLUSTERED INDEX	5,790249294	1099	16286	0	0	NULL
469576711	12	NONCLUSTERED INDEX	3,701399689	332	6430	90	0	NULL
469576711	15	NONCLUSTERED INDEX	3,472115532	351	6509	90	0	NULL
469576711	14	NONCLUSTERED INDEX	3,440682631	511	10899	90	0	NULL
469576711	18	NONCLUSTERED INDEX	3,35673541	180	4558	0	0	NULL
469576711	1	CLUSTERED INDEX	3,285175732	1841	42707	0	0	NULL
469576711	10	NONCLUSTERED INDEX	3,064243449	239	4732	0	0	NULL
1573580644	34	NONCLUSTERED INDEX	3,05318717	926	24630	0	0	NULL
1141579105	2	NONCLUSTERED INDEX	1,710847904	621	5319	0	0	NULL
469576711	5	NONCLUSTERED INDEX	1,593568301	538	13931	0	0	NULL
1141579105	8	NONCLUSTERED INDEX	1,290443239	440	5347	0	0	NULL
1141579105	7	NONCLUSTERED INDEX	0,866354211	543	7041	0	0	NULL

Sys.stats / sys.dm_db_stats_properties

Date de dernière mise à jour

Nombre de lignes

Nombre d'étapes de l'histogramme

Nombre de lignes modifiés

OBJECT_ID	stats_id	auto_created	no_recompute	user_created	is_incremental	is_temporary	row_count	used_page_count	last_updated	rows	rows_sampled	steps	unfiltered_rows	modification_counter
487672785	3	0	0	0	0	0	38 444 726	211158	2017-09-02 05:51:35.1930000	38 409 410	38 409 410	200	38 409 410	35 316
487672785	2	0	0	0	0	0	38 444 726	197295	2017-09-02 05:51:16.9900000	38 409 410	318 237	199	38 409 410	35 316
487672785	1	0	0	0	0	0	38 444 726	424193	2017-09-02 05:47:48.5770000	38 409 372	38 409 372	3	38 409 372	35 354
71671303	3	0	0	0	0	0	8 084 426	38152	2017-09-02 05:44:25.2270000	8 084 426	8 084 426	108	8 084 426	0
71671303	2	0	0	0	0	0	8 084 426	40809	2017-09-02 05:44:21.5230000	8 084 426	148 352	200	8 084 426	0
71671303	1	0	0	0	0	0	8 084 426	166502	2017-09-02 05:43:47.3900000	8 084 426	8 084 426	3	8 084 426	0
551673013	2	0	0	0	0	0	5 679 759	50652	2017-09-02 05:56:31.2830000	5 672 844	5 672 844	12	5 672 844	6 915
551673013	3	0	0	0	0	0	5 679 759	33002	2017-09-02 05:56:22.8030000	5 672 844	5 672 844	4	5 672 844	6 915
551673013	11	0	0	0	0	0	5 679 759	70788	2017-09-02 05:56:20.0630000	5 672 844	118 878	200	5 672 844	6 915
551673013	10	0	0	0	0	0	5 679 759	62000	2017-09-02 05:56:19.4800000	5 672 844	118 878	200	5 672 844	6 915
551673013	5	0	0	0	0	0	5 679 759	32715	2017-09-02 05:56:18.9170000	5 672 844	5 672 844	18	5 672 844	6 915
551673013	4	0	0	0	0	0	5 679 759	29397	2017-09-02 05:56:15.9830000	5 672 843	5 672 843	48	5 672 843	6 916
551673013	1	0	0	0	0	0	5 679 759	142666	2017-09-02 05:56:13.3070000	5 672 843	115 818	44	5 672 843	6 916
249767947	6	0	0	0	0	0	4 221 238	30880	2017-09-02 05:53:19.3300000	4 215 229	171 255	200	4 215 229	6 009
249767947	2	0	0	0	0	0	4 221 238	25080	2017-09-02 05:53:19.0200000	4 215 229	4 215 229	34	4 215 229	6 009
249767947	4	0	0	0	0	0	4 221 238	25082	2017-09-02 05:53:16.6600000	4 215 229	4 215 229	25	4 215 229	6 009
249767947	3	0	0	0	0	0	4 221 238	24431	2017-09-02 05:53:13.7300000	4 215 229	4 215 229	198	4 215 229	6 009
249767947	1	0	0	0	0	0	4 221 238	45975	2017-09-02 05:53:11.6030000	4 215 229	4 215 229	3	4 215 229	6 009
199671759	15	0	0	0	0	0	3 924 797	20923	2017-09-02 05:47:07.4330000	3 920 081	116 872	200	3 920 081	4 716
199671759	11	0	0	0	0	0	3 924 797	39241	2017-09-02 05:47:07.2470000	3 920 081	116 872	200	3 920 081	4 716

DMVs et DMFs

Enormément d'informations renvoyées

Interprétation des chiffres !

Vision historique

Vision temps reel

sp_whoisactive (@AdamMachanic)

Scripts Glenn Berry (@GlennAlanBerry)

<https://www.sqlskills.com/blogs/glenn/category/dmv-queries/>

A large, stylized teal graphic on the left side of the slide, resembling a thick, curved arrow or a stylized letter 'C' that points towards the right.

Compteurs de performance

Compteurs de performance

Approche système

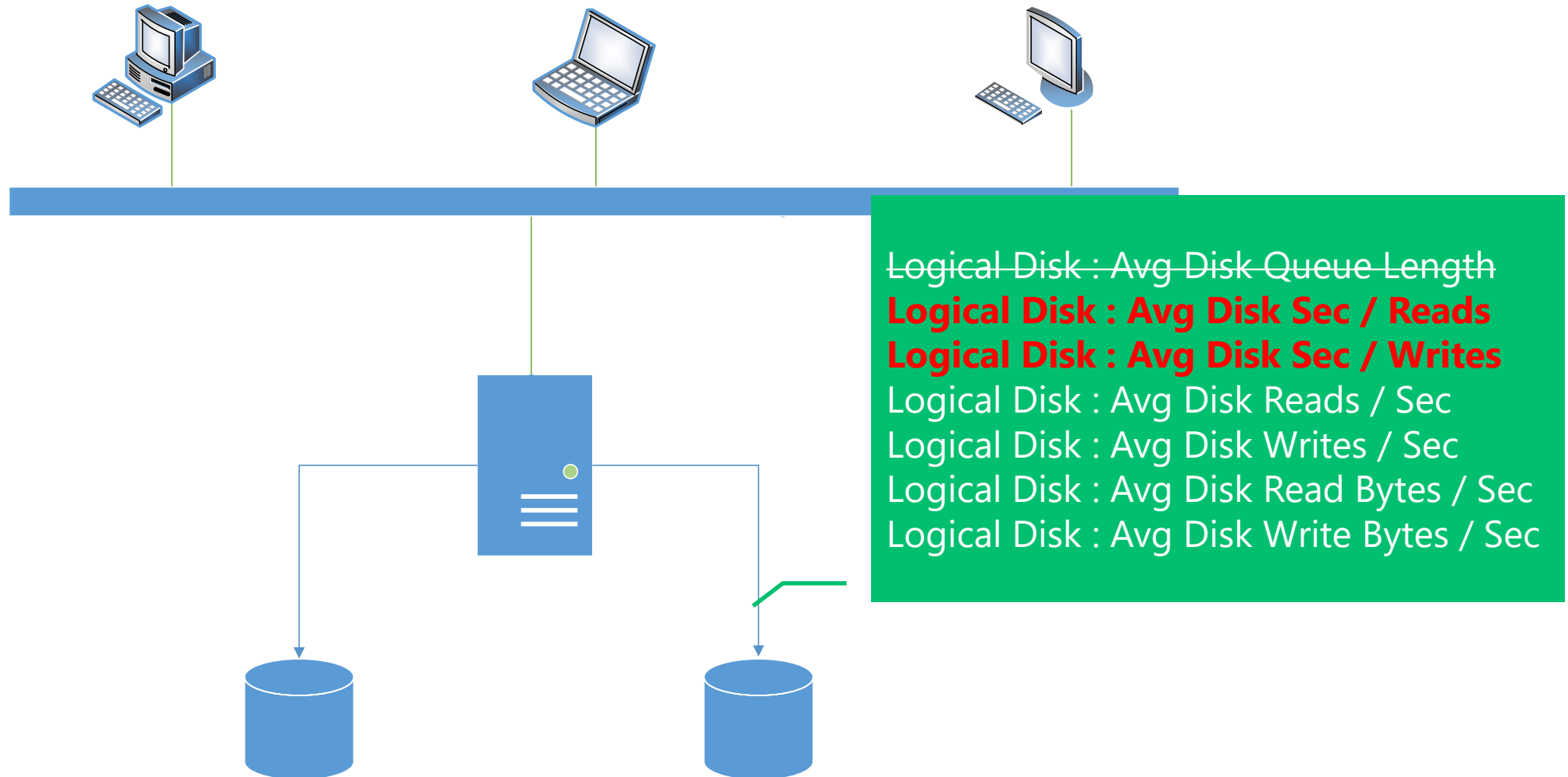
587 compteurs (13 SP1)

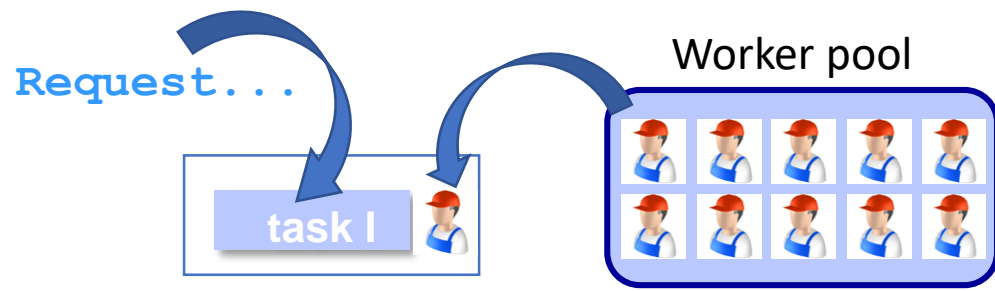
Orienté administrateur système

Permet de lever des alertes / envoi d'email

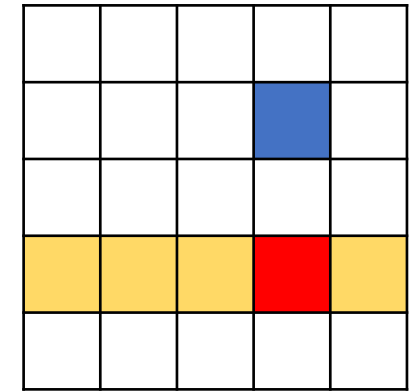
MSSQL\$PROD:Databases	_Total
Transactions/sec	85 869,305
MSSQL\$PROD:General Statistics	
User Connections	1 073,000
MSSQL\$PROD:Locks	_Total
Average Wait Time (ms)	0,000
Lock Requests/sec	2 245 316,023
Lock Timeouts (timeout > 0)/sec	0,000
Lock Timeouts/sec	2,006
Lock Wait Time (ms)	0,000
Lock Waits/sec	0,000
Number of Deadlocks/sec	0,000

Activité disque





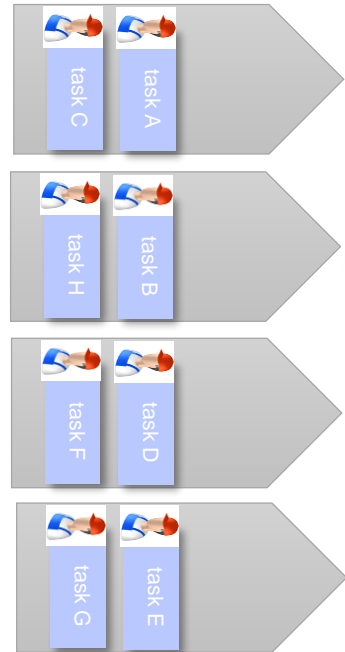
Free List



Buffer pool

Log
Cache

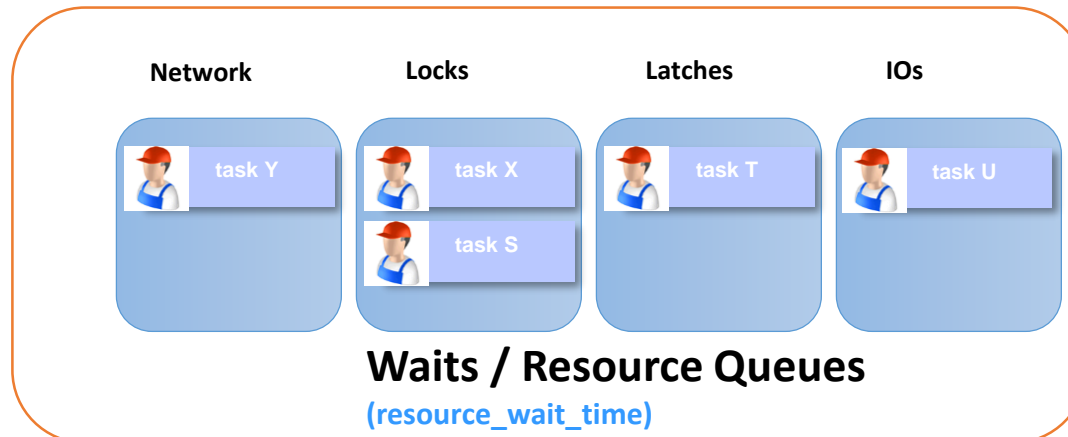
SQL Server Databases : Percent Log Used
SQL Server Databases : Transactions/sec
SQL Server Databases : Log Flush Wait Time
SQL Server Databases : Log Flush Waits/Sec



Runnable Queue
(signal_wait_time)

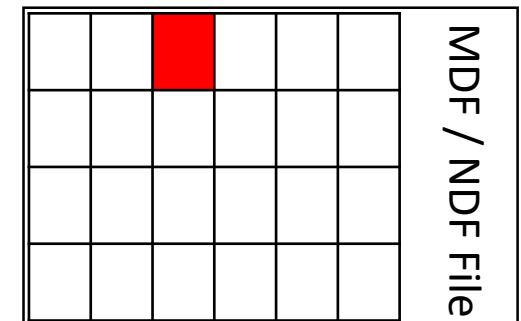


Running

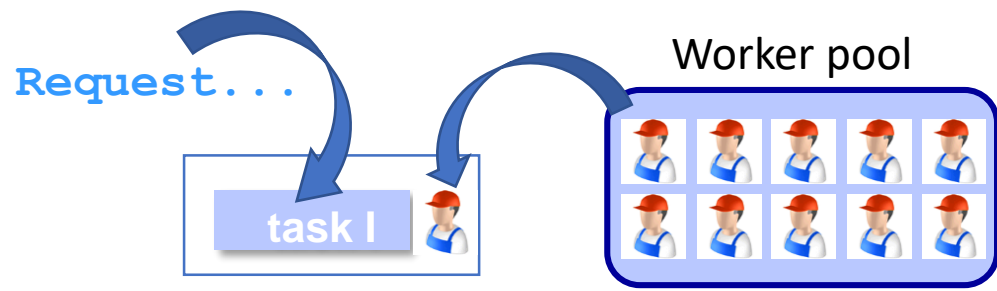


Insert
Update
Delete
Merge
Truncate

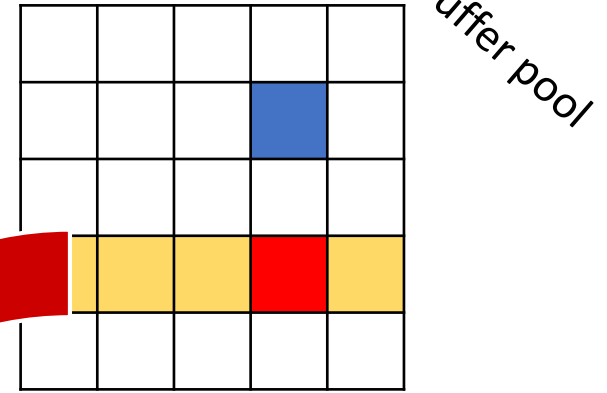
LDF File



MDF / NDF File



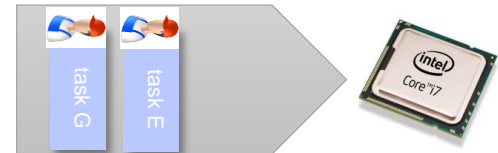
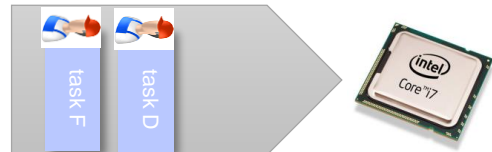
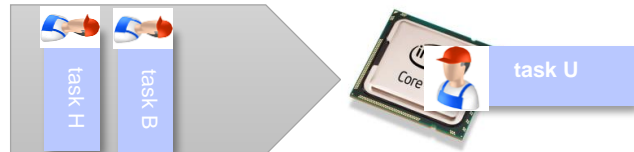
Free List



Log
Cache

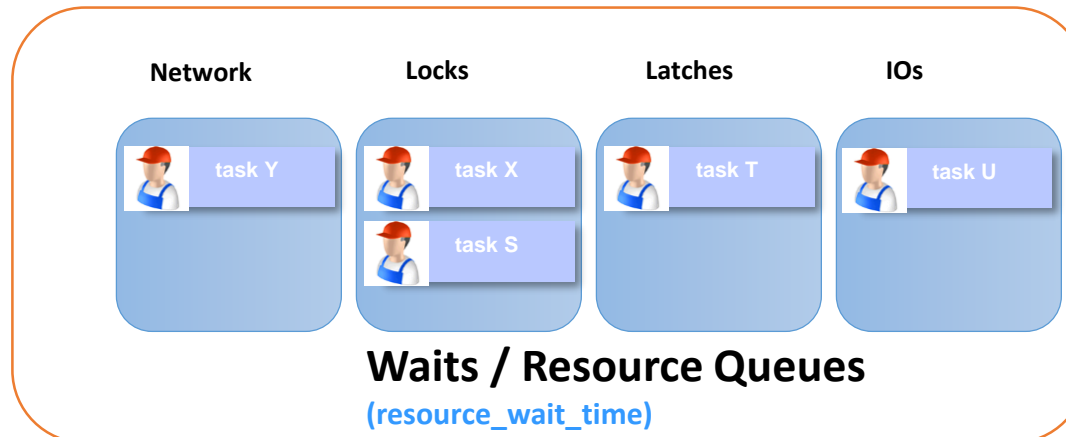
SQL Server Buffer manager : Checkpoint Pages/sec

Checkpoint



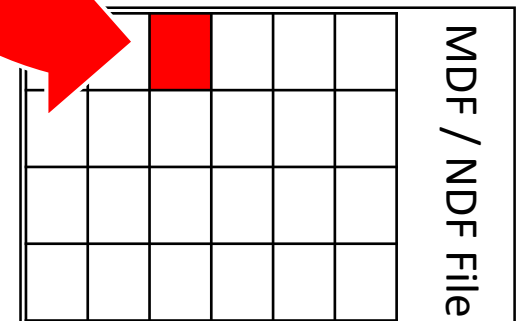
Runnable Queue
(signal_wait_time)

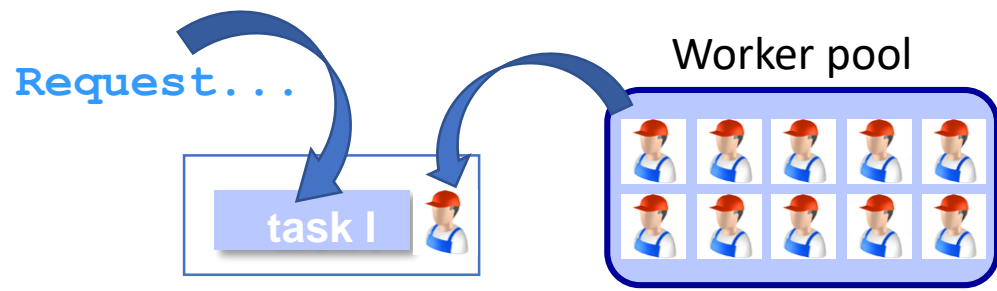
Running



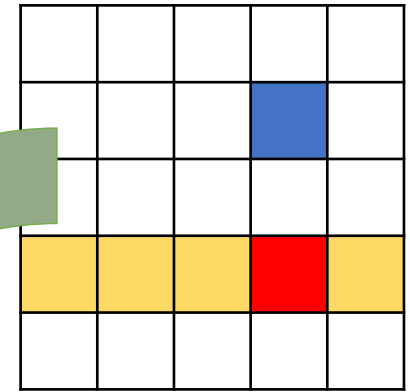
Insert
Update
Delete
Merge
Truncate

LD F File





Free List



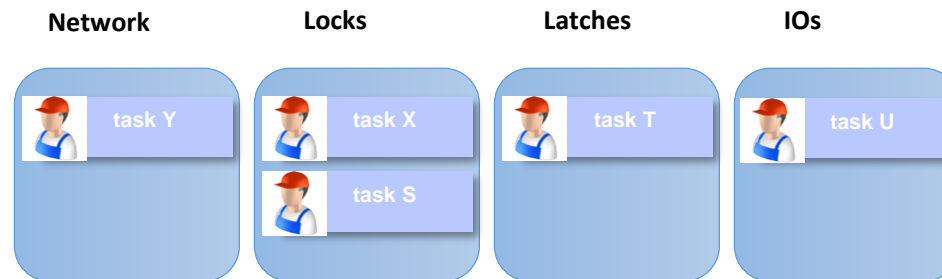
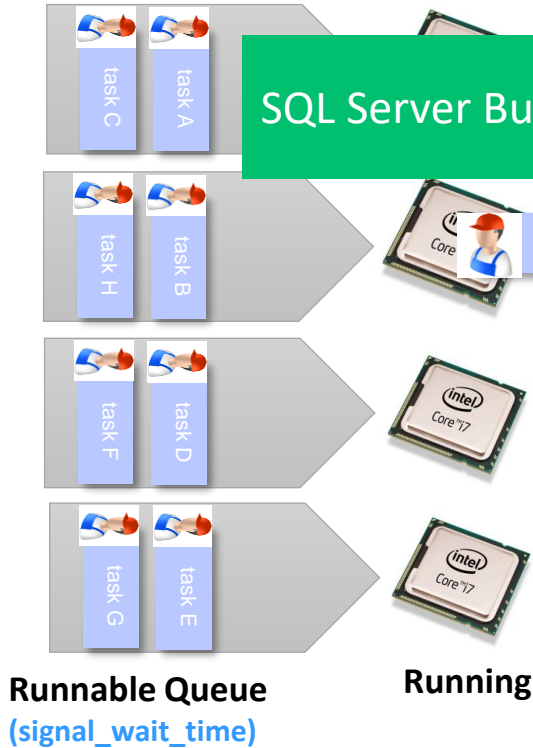
Log Cache

SQL Server Buffer manager : Lazy Writes/sec

Lazy Writer

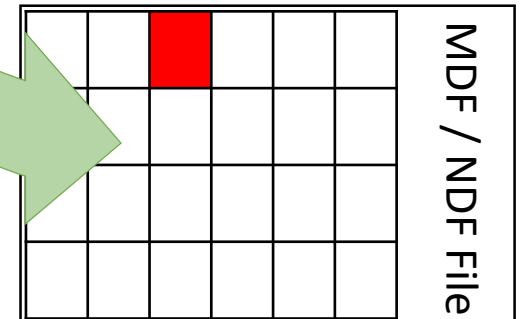
Insert
Update
Delete
Merge
Truncate

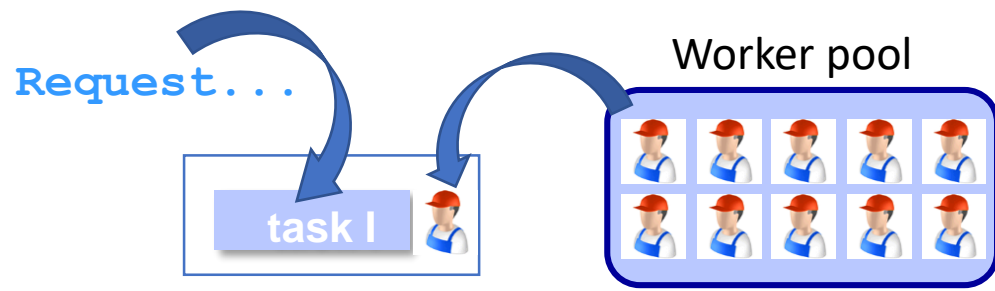
LDF File



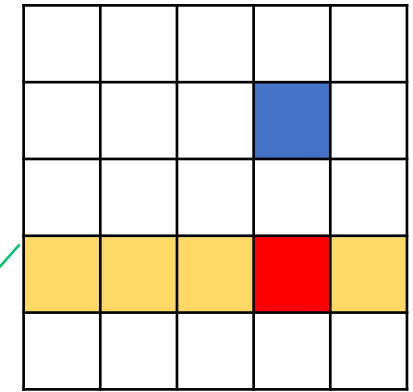
Waits / Resource Queues
(resource_wait_time)

MDF / NDF File





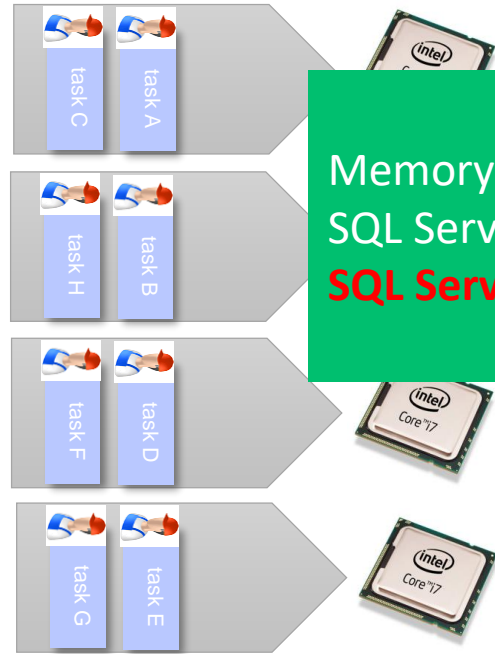
Free List



Buffer pool

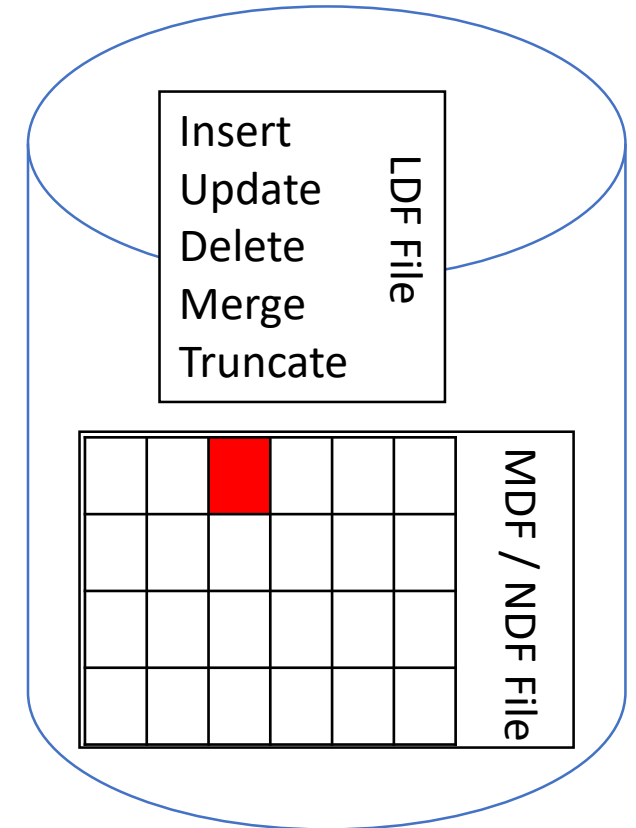
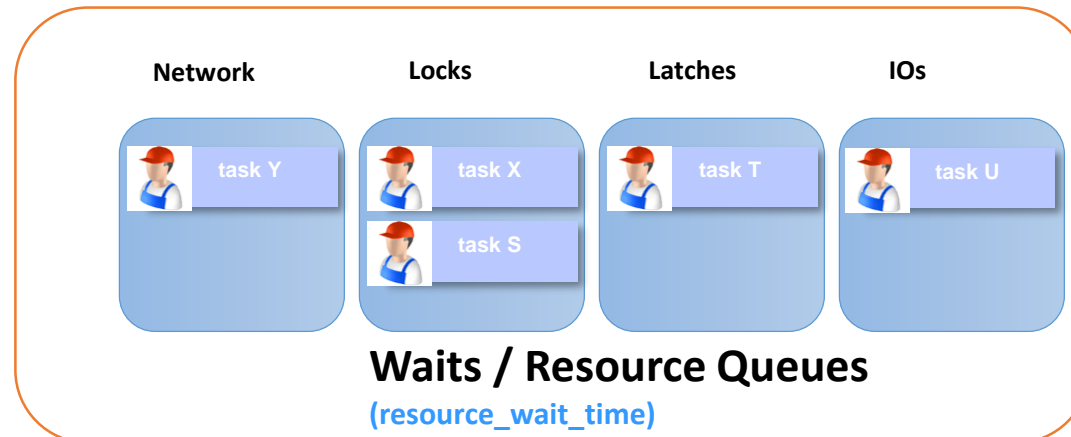
Log
Cache

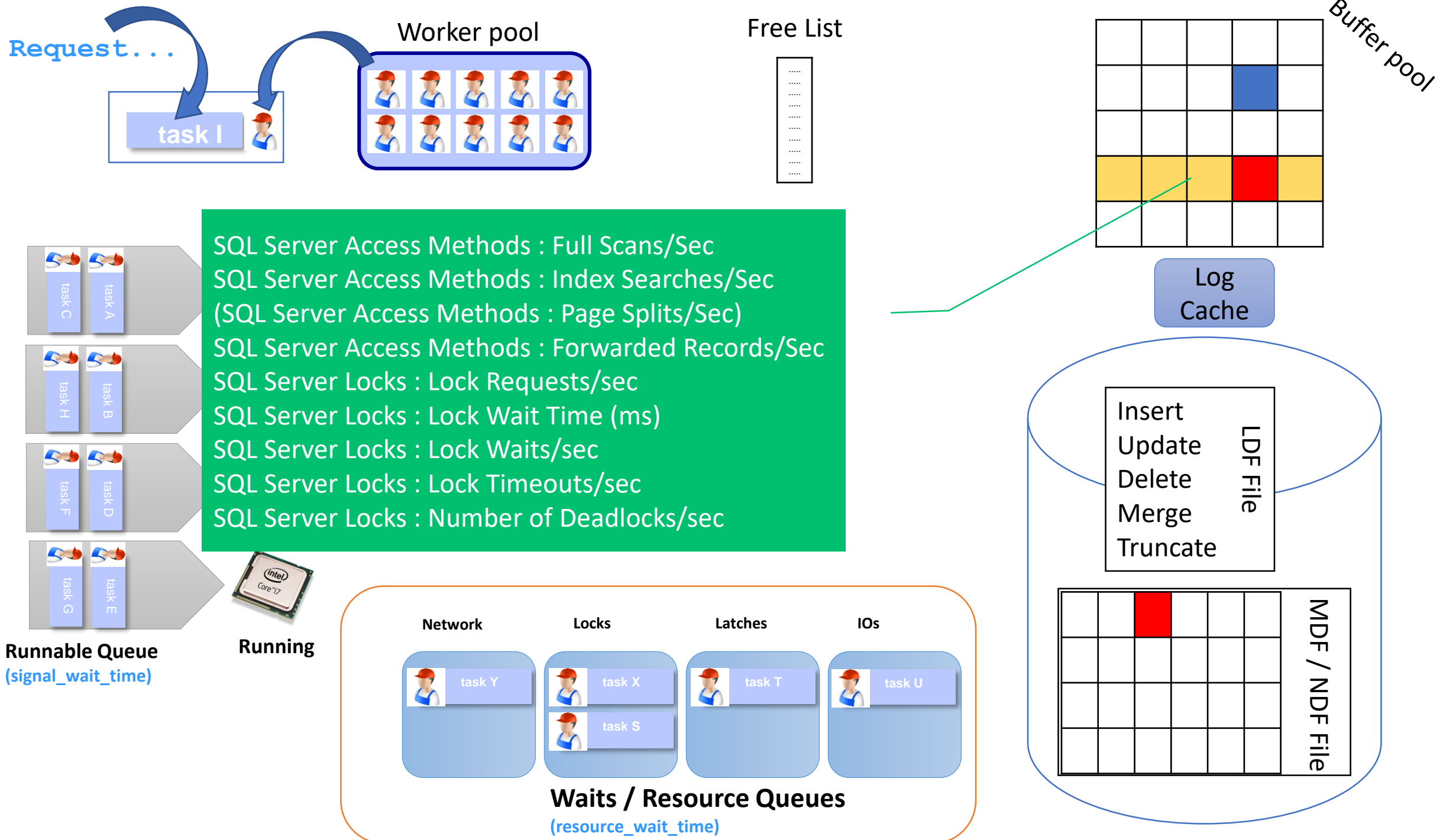
Memory : Available MBytes
 SQL Server Buffer Manager : Buffer Cache Hit Ratio
SQL Server Buffer Manager : Page Life Expectancy

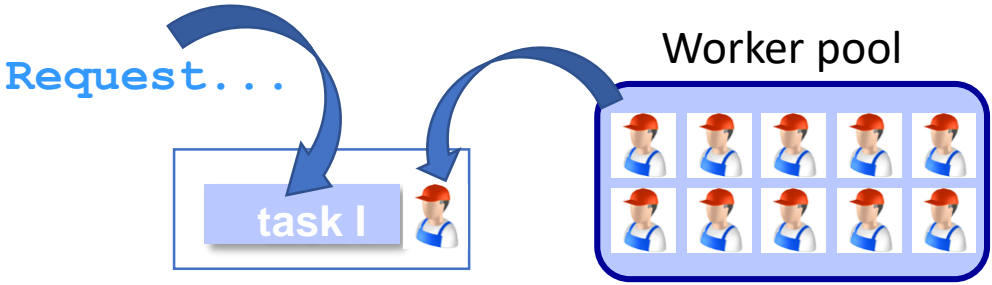


Runnable Queue
 (signal_wait_time)

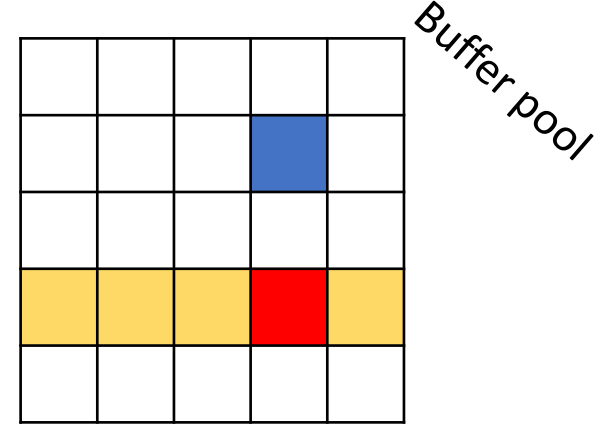
Running





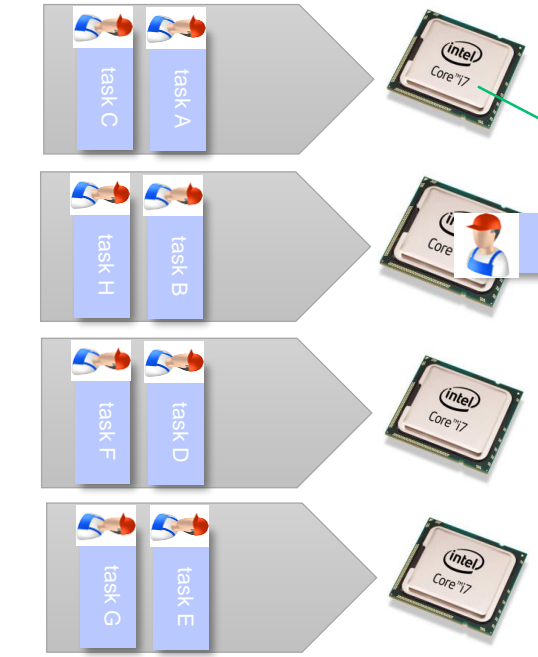


Free List



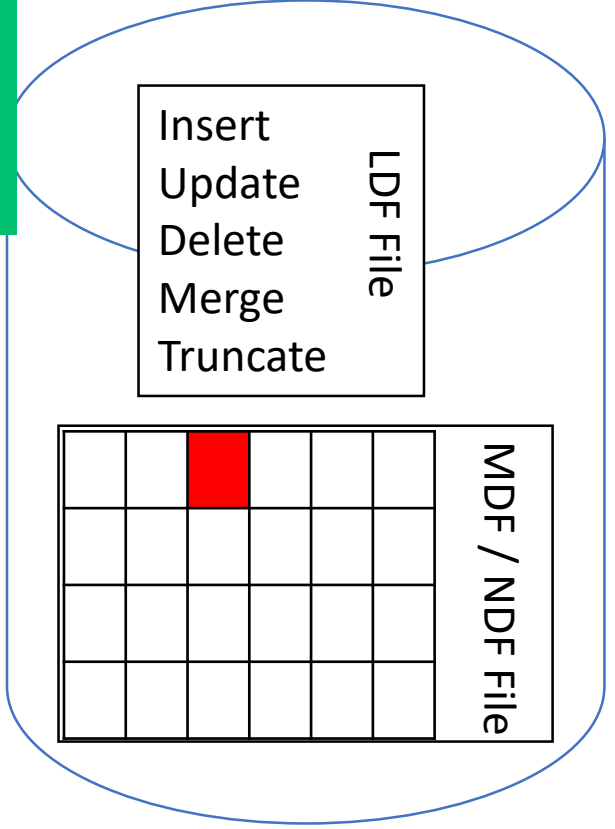
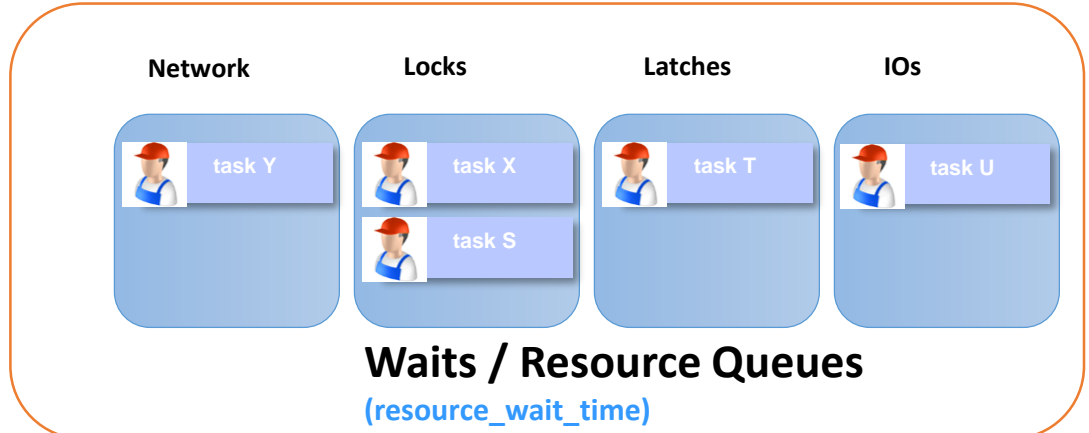
Log Cache

Processor : % Processor Time [Total]
Processor : % Privilege Time
Processor : % User Time



Runnable Queue
(signal_wait_time)

Running



Compteurs de performance

Outils de monitoring

Nagios / Centreon / Zabbix / Cacti

Microsoft SCOM

Solarwinds

PRTG

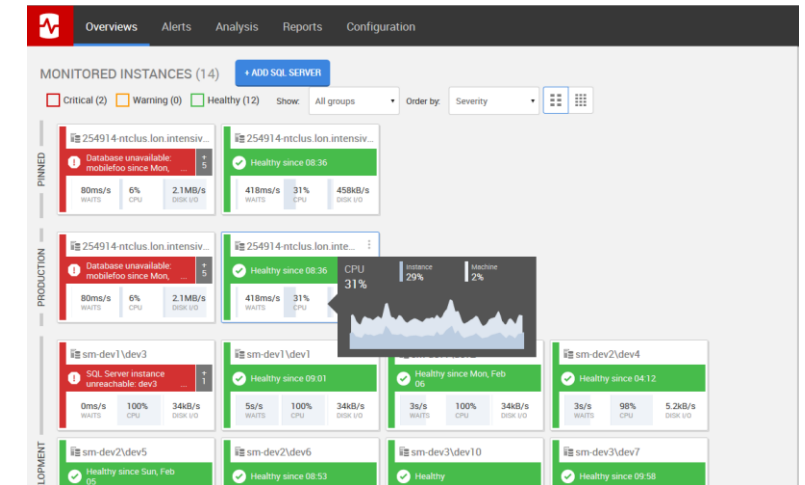
RedGate SQLMonitor

SentryOne SQLSentry

Quest Foglight / Spotlight

Idera SQL Diagnostic Manager

Kankuru



[illegible]

 christophe_laporte@hotmail.fr

 <http://conseil.it.wordpress.com/>

 @conseilit

Outils à disposition

SSMS

xEvents, requêtes, plans d'exécution

SQL Server Profiler

Powershell

DBATools.io

PAL

Collection de compteurs -> fichier BLG

Rapports

Simplicité d'emploi

Pas seulement réservé à SQL Server

PSSDiag/SQLDiag & SQLNexus

Analyse de problèmes de performance

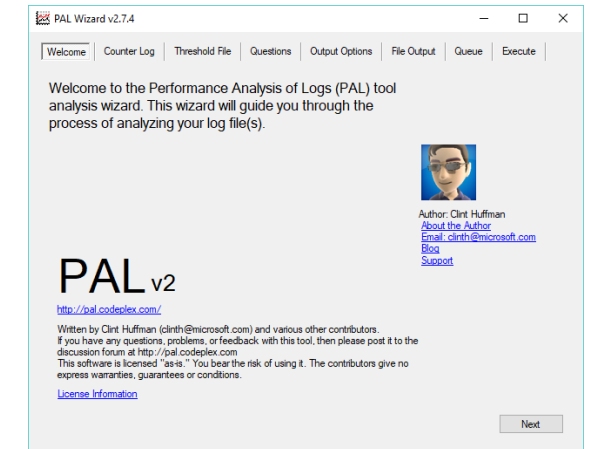
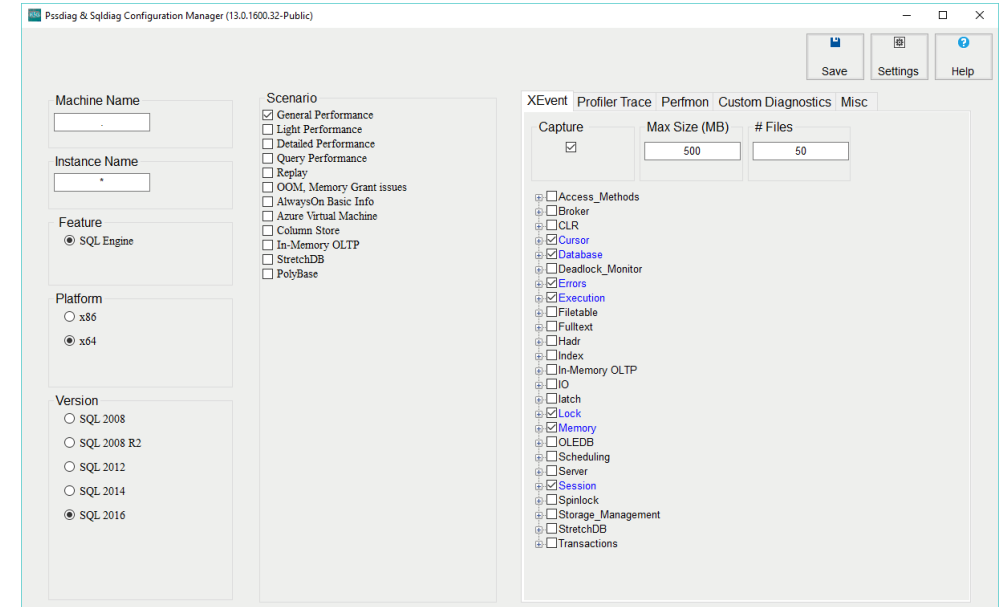
SQLDiag

Collection de données (event log Windows, fichier BLG, Traces, Errorlog, ..)

SQLNexus

Orienté restitution graphique (blocages, attentes, analyse des traces)

xPerf



Conclusion

Problèmes les plus courants :

- IO disque (latence)

- Verrouillage excessif

- Statistiques hors d'âge

- Gestion du parallélisme

- Mauvaise configuration (de VM)

- Application client (RBAR, ...)

Importance d'une bonne configuration

- Host / VM

- Windows

- SQL

- Plan de maintenance (Gestion des index / statistiques d'index)

Un peu de méthode, un peu d'expérience et quelques outils suffisent

Offrez vous un audit 😊



Merci

Merci pour votre attention
Q/R

