

■ Performance Test Result

This document contains the actual time measured during the VaR margin calculation process using the new software.

This data is provided as reference for building an environment of your own.

Please note that it only serves as a guide, and you will have to make adjustments according to the environment and method of your use.

1. API Application (Information Added)
2. API Application (Multiple Requests)
3. CLI Application
4. GUI Application

Change History

#	Date	Version	Sheet	Description
1	Nov. 1, 2022	1.0		First Release
2	Jan. 31, 2023	1.01	Outline	Addition of new sheet names to the list Removal of an obsolete sentence
3			1. API App	Addition of measurement result using a different machine
4			3. CLI App 4. GUI App	Addition of sheets

1. API Application

Measurement Description

The time for processing API requests described in "2.5.1 Input File Reading" and "2.5.2 Calculation" in the API Application Specification was measured.

The measurement for input file reading shows the time required to execute 1 reading process of 3 files: BPF, VPF and APF. The number of instruments in the BPF was varied as seen in the Measurement Result table below.

The measurement for calculation process shows the time required to process 1 request with account and position settings seen in the Calculation table below.

Measurement Environment

The following AWS virtual machines were used.

A Amazon EC2 Instance: m5d.12xlarge CPU: 48Cores 2.5GHz Memory: 192GiB SSD

B Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.5GHz Memory: 16GiB SSD

The following parameter settings were used for measurement. (Parameters not affecting process time are left out.)

pool.size.max = pool.size.core

pool.size.queue = 0 (* All calculation processes not allocated to threads will be moved to the queue.

pool.threshold = 50 (* Calculation processes will be allocated to threads account-by-account and executed.)

server.tomcat.threads.max = 200

server.tomcat.threads.min-spare = 10

server.tomcat.accept-count = 100

Measurement Result

Input File Reading

(Unit: ms)

#	Item	Setting	Machine A (Core:48)	Machine B (Core:4)
			pool.size.core=1	
1	BPF target instrument	1,000	2,735	4,071
2	BPF target instrument	7,000	19,307	28,208
3	BPF target instrument	15,000	40,839	61,973
4	BPF target instrument	30,000	88,022	124,497
5	BPF target instrument	50,000	162,645	—

Calculation

(Unit: ms)

#	Item	Setting	Machine A (Core:48)			
			pool.size.core=1	pool.size.core=5	pool.size.core=20	pool.size.core=50
			OutputType:All	OutputType:All	OutputType:All	OutputType:All
1	Number of accounts	5,000	3,749	1,226	1,004	966
	Average number of positions per account	2				
2	Number of accounts	10,000	7,404	2,359	1,502	1,815
	Average number of positions per account	2				
3	Number of accounts	25,000	18,968	5,942	3,553	4,349
	Average number of positions per account	2				
4	Number of accounts	50,000	38,066	12,651	7,404	9,468
	Average number of positions per account	2				
5	Number of accounts	10	314	423	427	138
	Average number of positions per account	100				
6	Number of accounts	50	206	107	89	105
	Average number of positions per account	10				
7	Number of accounts	500	609	240	170	171
	Average number of positions per account	3				
8	Number of accounts	1,000	833	290	193	242
	Average number of positions per account	2				
9	Number of accounts	2,000	2,264	759	485	519
	Average number of positions per account	3				
10	Number of accounts	4,000	7,510	2,343	1,491	1,518
	Average number of positions per account	5				

(Unit: ms)

#	Item	Setting	Machine B (Core:4)	
			pool.size.core=1	pool.size.core=5
			OutputType:ALL	OutputType:ALL
1	Number of accounts	5,000	5,078	2,700
	Average number of positions per account	2		
2	Number of accounts	10	446	340
	Average number of positions per account	100		
3	Number of accounts	1,000	1,239	792
	Average number of positions per account	2		

2. API Application (Multiple Requests)

Measurement Description

The number of API requests in this volume "2.5.2 Calculation" defined in the "Setting" on the table of Measurement Result were processed simultaneously by the API application, and the average processing time of these requests was measured.

The calculation object (Output Type) was VaR Margin.

Only 1 account was contained in a request.

The number of positions contained in 1 account was 50.

Measurement Environment

The following 2 machines were used.

A: Amazon EC2 Instance: m5d.12xlarge CPU: 48Cores 2.5GHz Memory: 192GiB SSD

B: Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.2GHz Memory: 16GiB SSD

Parameter Settings

The following parameter settings were used for measurement. (Parameters not affecting process time are left out.)

pool.threshold = 50 (* All requests processed in multithread processing.Only the influence of tomcat threads was measured.)

server.tomcat.threads.min-spare =server.tomcat.threads.max

Measurement Result

(Unit: TPS)

#	Item	Setting	Machine A (Core:48)			
			server.tomcat.threads.max=1	server.tomcat.threads.max=5	server.tomcat.threads.max=20	server.tomcat.threads.max=50
			OutputType:VaR Margin	OutputType:VaR Margin	OutputType:VaR Margin	OutputType:VaR Margin
1	Number of requests simultaneously sent	1	73	74	72	72
2		3	83	211	208	209
3		10	82	404	679	658
4		50	84	400	1291	1706
5		100	83	395	1288	1683
6		1,000	84	405	1289	1649

*E.g., for server.tomcat.threads.max=5 and Setting=100 the TPS is 395. This gives a process time of 253 msec per request.

*Remark the performance will not be significantly improved when server.tomcat.threads.max is more than the number of the machine core.

(Unit: TPS)

#	Item	Setting	Machin B (Core:4)	
			server.tomcat.threads.max=1	server.tomcat.threads.max=5
			OutputType:VaR Margin	OutputType:VaR Margin
1	Number of requests simultaneously sent	1	53	54
2		3	53	122
3		10	61	143
4		50	61	136
5		100	61	149

3. CLI Application

Measurement Description

The time required for calculation in accordance with the procedure described in "2.2.2 Execution of Calculation" in the CLI Application Specification was measured.

The time required for parameter file reading and the time required for processing requests with the account and position details seen in the Calculation table below are listed.

Measurement Environment

The following AWS virtual machines were used.

A Amazon EC2 Instance: m5d.12xlarge CPU: 48Cores 2.5GHz Memory: 192GiB SSD

B Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.5GHz Memory: 16GiB SSD

The following parameter settings were used for measurement. (Parameters not affecting process time are left out.)

pool.size.max = pool.size.core (* Time required for thread increase will not be measured.)

pool.size.queue = 0 (* Without request timeout)

pool.threshold = 1 (* All requests will be processed by multithreading.)

Measurement Result

Calculation

(Unit: ms)

#	Item	Setting	Machine A (Core:48)			
			pool.size.core=1	pool.size.core=5	pool.size.core=20	pool.size.core=50
			OutputType:ALL	OutputType:ALL	OutputType:ALL	OutputType:ALL
1	BPF Target Instrument	7,000	Total: 20,005	Total: 19,746	Total: 19,653	Total: 19,619
	Number of accounts	1,000	File Reading: 18,106	File Reading: 18,332	File Reading: 18,268	File Reading: 18,090
	Average number of positions per account	2	Margin Calc.: 947	Margin Calc.: 480	Margin Calc.: 450	Margin Calc.: 583
2	BPF Target Instrument	7,000	Total: 21,676	Total: 20,730	Total: 20,649	Total: 20,806
	Number of accounts	2,000	File Reading: 19,034	File Reading: 19,045	File Reading: 19,067	File Reading: 19,097
	Average number of positions per account	2	Margin Calc.: 1,700	Margin Calc.: 735	Margin Calc.: 634	Margin Calc.: 760
3	BPF Target Instrument	7,000	Total: 25,085	Total: 22,624	Total: 22,348	Total: 22,506
	Number of accounts	5,000	File Reading: 20,279	File Reading: 20,244	File Reading: 20,330	File Reading: 20,273
	Average number of positions per account	2	Margin Calc.: 3,872	Margin Calc.: 1,429	Margin Calc.: 1,073	Margin Calc.: 1,289
4	BPF Target Instrument	7,000	Total: 28,981	Total: 24,303	Total: 23,226	Total: 23,556
	Number of accounts	10,000	File Reading: 20,645	File Reading: 20,849	File Reading: 20,584	File Reading: 20,488
	Average number of positions per account	2	Margin Calc.: 7,389	Margin Calc.: 2,507	Margin Calc.: 1,705	Margin Calc.: 2,112
5	BPF Target Instrument	30,000	Total: 73,046	Total: 72,873	Total: 73,066	Total: 73,453
	Number of accounts	10	File Reading: 71,715	File Reading: 71,473	File Reading: 71,681	File Reading: 72,083
	Average number of positions per account	100	Margin Calc.: 398	Margin Calc.: 421	Margin Calc.: 455	Margin Calc.: 436
6	BPF Target Instrument	30,000	Total: 72,994	Total: 73,444	Total: 73,237	Total: 72,745
	Number of accounts	50	File Reading: 71,726	File Reading: 72,227	File Reading: 72,018	File Reading: 71,516
	Average number of positions per account	10	Margin Calc.: 318	Margin Calc.: 279	Margin Calc.: 285	Margin Calc.: 271
7	BPF Target Instrument	30,000	Total: 73,374	Total: 72,797	Total: 73,303	Total: 73,820
	Number of accounts	500	File Reading: 71,658	File Reading: 71,438	File Reading: 71,979	File Reading: 72,357
	Average number of positions per account	3	Margin Calc.: 776	Margin Calc.: 408	Margin Calc.: 379	Margin Calc.: 521
8	BPF Target Instrument	1,000	Total: 4,880	Total: 4,628	Total: 4,616	Total: 4,689
	Number of accounts	500	File Reading: 3,278	File Reading: 3,294	File Reading: 3,271	File Reading: 3,283
	Average number of positions per account	2	Margin Calc.: 655	Margin Calc.: 391	Margin Calc.: 401	Margin Calc.: 466
9	BPF Target Instrument	1,000	Total: 5,584	Total: 4,908	Total: 4,883	Total: 4,975
	Number of accounts	1,000	File Reading: 3,303	File Reading: 3,315	File Reading: 3,316	File Reading: 3,305
	Average number of positions per account	3	Margin Calc.: 1,344	Margin Calc.: 655	Margin Calc.: 632	Margin Calc.: 736
10	BPF Target Instrument	1,000	Total: 8,306	Total: 5,964	Total: 5,587	Total: 5,763
	Number of accounts	2,000	File Reading: 3,441	File Reading: 3,482	File Reading: 3,410	File Reading: 3,458
	Average number of positions per account	5	Margin Calc.: 3,913	Margin Calc.: 1,540	Margin Calc.: 1,206	Margin Calc.: 1,342

* Since file reading is performed by a single core, changing pool.size.core does not influence the processing time.

* Remark the performance will not be significantly improved when server.tomcat.threads.max is more than the number of the machine core.

(Unit: ms)

#	Item	Setting	Machine B (Core:4)	
			pool.size.core=1	pool.size.core=5
			OutputType:ALL	OutputType:ALL
1	BPF Target Instrument	7,000	Total: 29,196	Total: 28,914
	Number of accounts	1,000	File Reading: 25,528	File Reading: 25,736
	Average number of positions per account	2	Margin Calc.: 1,913	Margin Calc.: 1,440
2	BPF Target Instrument	30,000	Total: 104,797	Total: 104,337
	Number of accounts	10	File Reading: 102,336	File Reading: 101,925
	Average number of positions per account	100	Margin Calc.: 717	Margin Calc.: 688
3	BPF Target Instrument	1,000	Total: 7,643	Total: 7,352
	Number of accounts	500	File Reading: 4,733	File Reading: 4,602
	Average number of positions per account	2	Margin Calc.: 1,177	Margin Calc.: 985

4. GUI Application

Measurement Description

The time required for calculation in accordance with the procedure described in "2.2.3 Execution of Calculation" in the GUI Application Specification was measured.

The time required for parameter file reading and the time required for processing requests with the account and position details seen in the Calculation table below are listed.

Measurement Environment

The following physical machine was used.

C Physical terminal (Dell Latitude3520) CPU: Core (TM) i7-1165G7 Memory: 16GB SSD

The following parameter settings were used for measurement. (Parameters not affecting process time are left out.)

pool.size.max = pool.size.core (* Time required for thread increase will not be measured.)

pool.size.queue = 0 (* Without request timeout)

pool.threshold = 1 (* All requests will be processed by multithreading.)

Measurement Result

Calculation

(Unit: ms)

#	Item	Setting	Machine C (Core:4)		
			pool.size.core=1	pool.size.core=4	pool.size.core=8
			OutputType:ALL	OutputType:ALL	OutputType:ALL
1	BPF Target Instrument	7,000	Total: 18,182	Total: 18,831	Total: 19,417
	Number of accounts	100	File Reading: 17,548	File Reading: 18,224	File Reading: 18,829
	Average number of positions per account	5	Margin Calc.: 333	Margin Calc.: 311	Margin Calc.: 295
2	BPF Target Instrument	7,000	Total: 23,892	Total: 20,056	Total: 20,292
	Number of accounts	200	File Reading: 22,750	File Reading: 19,210	File Reading: 19,442
	Average number of positions per account	5	Margin Calc.: 656	Margin Calc.: 392	Margin Calc.: 416
3	BPF Target Instrument	30,000	Total: 82,466	Total: 78,007	Total: 79,378
	Number of accounts	100	File Reading: 80,478	File Reading: 76,487	File Reading: 77,801
	Average number of positions per account	50	Margin Calc.: 1,468	Margin Calc.: 993	Margin Calc.: 1,037
4	BPF Target Instrument	30,000	Total: 81,886	Total: 69,468	Total: 69,727
	Number of accounts	200	File Reading: 78,665	File Reading: 67,956	File Reading: 68,151
	Average number of positions per account	50	Margin Calc.: 2,430	Margin Calc.: 976	Margin Calc.: 1,017
5	BPF Target Instrument	1,000	Total: 3,847	Total: 3,660	Total: 3,731
	Number of accounts	100	File Reading: 2,936	File Reading: 2,897	File Reading: 2,964
	Average number of positions per account	20	Margin Calc.: 630	Margin Calc.: 479	Margin Calc.: 476
6	BPF Target Instrument	1,000	Total: 4,179	Total: 3,934	Total: 3,958
	Number of accounts	200	File Reading: 2,845	File Reading: 2,888	File Reading: 2,942
	Average number of positions per account	20	Margin Calc.: 944	Margin Calc.: 647	Margin Calc.: 630