

■ 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
5	Jan. 30, 2024	2.0	1. API App 2. API App (Multiple Requests) 3. CLI App 4. GUI App	Update "Measurement Result"

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 OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

B Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.2GHz Memory: 16GiB SSD OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

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	892	1,333
2	BPF target instrument	7,000	6,319	10,073
3	BPF target instrument	15,000	13,433	23,124
4	BPF target instrument	30,000	26,791	46,940
5	BPF target instrument	50,000	80,400	—

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	3,639	1,094	642	814
	Average number of positions per account	2				
2	Number of accounts	10,000	7,189	2,109	1,187	1,546
	Average number of positions per account	2				
3	Number of accounts	25,000	17,848	5,257	2,855	3,796
	Average number of positions per account	2				
4	Number of accounts	50,000	35,928	10,839	6,275	7,778
	Average number of positions per account	2				
5	Number of accounts	10	305	175	135	132
	Average number of positions per account	100				
6	Number of accounts	50	205	104	98	106
	Average number of positions per account	10				
7	Number of accounts	500	594	213	154	169
	Average number of positions per account	3				
8	Number of accounts	1,000	801	258	179	214
	Average number of positions per account	2				
9	Number of accounts	2,000	2,174	673	408	452
	Average number of positions per account	3				
10	Number of accounts	4,000	6,957	2,073	1,167	1,229
	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	5,585	2,821
	Average number of positions per account	2		
2	Number of accounts	10	488	333
	Average number of positions per account	100		
3	Number of accounts	1,000	1,319	832
	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 OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

B: Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.2GHz Memory: 16GiB SSD OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

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	81	81	79	78
2		3	90	237	232	234
3		10	90	432	741	749
4		50	90	426	1297	1782
5		100	90	430	1324	1723
6		1,000	90	433	1321	1721

*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	51	51
2		3	59	127
3		10	60	158
4		50	61	156
5		100	59	157

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 OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

B Amazon EC2 Instance: m5ad.xlarge CPU: 4Cores 2.2GHz Memory: 16GiB SSD OS: Red Hat Enterprise Linux Server release 7.7 (Maipo) Java: openjdk version "1.8.0_332"

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: 7,994	Total: 7,479	Total: 7,450	Total: 7,538
	Number of accounts	1,000	File Reading: 5,833	File Reading: 5,798	File Reading: 5,814	File Reading: 5,789
	Average number of positions per account	2	Margin Calc: 1,142	Margin Calc: 685	Margin Calc: 635	Margin Calc: 769
2	BPF Target Instrument	7,000	Total: 9,512	Total: 8,551	Total: 8,502	Total: 8,613
	Number of accounts	2,000	File Reading: 6,520	File Reading: 6,492	File Reading: 6,488	File Reading: 6,519
	Average number of positions per account	2	Margin Calc: 1,954	Margin Calc: 1,042	Margin Calc: 992	Margin Calc: 1,064
3	BPF Target Instrument	7,000	Total: 12,788	Total: 10,370	Total: 10,044	Total: 10,244
	Number of accounts	5,000	File Reading: 7,507	File Reading: 7,484	File Reading: 7,514	File Reading: 7,510
	Average number of positions per account	2	Margin Calc: 4,277	Margin Calc: 1,879	Margin Calc: 1,526	Margin Calc: 1,740
4	BPF Target Instrument	7,000	Total: 16,502	Total: 11,762	Total: 11,090	Total: 11,451
	Number of accounts	10,000	File Reading: 7,735	File Reading: 7,732	File Reading: 7,793	File Reading: 7,761
	Average number of positions per account	2	Margin Calc: 7,774	Margin Calc: 3,004	Margin Calc: 2,285	Margin Calc: 2,683
5	BPF Target Instrument	30,000	Total: 21,360	Total: 21,587	Total: 21,606	Total: 21,624
	Number of accounts	10	File Reading: 19,943	File Reading: 20,066	File Reading: 20,027	File Reading: 20,083
	Average number of positions per account	100	Margin Calc: 404	Margin Calc: 507	Margin Calc: 541	Margin Calc: 556
6	BPF Target Instrument	30,000	Total: 21,351	Total: 21,230	Total: 21,250	Total: 21,246
	Number of accounts	50	File Reading: 20,003	File Reading: 19,926	File Reading: 19,938	File Reading: 19,984
	Average number of positions per account	10	Margin Calc: 341	Margin Calc: 310	Margin Calc: 306	Margin Calc: 267
7	BPF Target Instrument	30,000	Total: 22,367	Total: 21,926	Total: 22,012	Total: 22,135
	Number of accounts	500	File Reading: 20,528	File Reading: 20,452	File Reading: 20,528	File Reading: 20,547
	Average number of positions per account	3	Margin Calc: 820	Margin Calc: 483	Margin Calc: 486	Margin Calc: 596
8	BPF Target Instrument	1,000	Total: 2,972	Total: 2,688	Total: 2,720	Total: 2,806
	Number of accounts	500	File Reading: 1,288	File Reading: 1,288	File Reading: 1,306	File Reading: 1,285
	Average number of positions per account	2	Margin Calc: 686	Margin Calc: 410	Margin Calc: 397	Margin Calc: 515
9	BPF Target Instrument	1,000	Total: 3,776	Total: 3,053	Total: 3,007	Total: 3,277
	Number of accounts	1,000	File Reading: 1,319	File Reading: 1,327	File Reading: 1,324	File Reading: 1,347
	Average number of positions per account	3	Margin Calc: 1,475	Margin Calc: 730	Margin Calc: 692	Margin Calc: 915
10	BPF Target Instrument	1,000	Total: 6,495	Total: 4,094	Total: 3,858	Total: 4,026
	Number of accounts	2,000	File Reading: 1,440	File Reading: 1,425	File Reading: 1,422	File Reading: 1,421
	Average number of positions per account	5	Margin Calc: 4,052	Margin Calc: 1,675	Margin Calc: 1,427	Margin Calc: 1,610

* 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: 12,344	Total: 11,909
	Number of accounts	1,000	File Reading: 8,275	File Reading: 8,314
	Average number of positions per account	2	Margin Calc: 2,264	Margin Calc: 1,781
2	BPF Target Instrument	30,000	Total: 30,390	Total: 30,767
	Number of accounts	10	File Reading: 27,812	File Reading: 28,314
	Average number of positions per account	100	Margin Calc: 777	Margin Calc: 669
3	BPF Target Instrument	1,000	Total: 5,510	Total: 5,220
	Number of accounts	500	File Reading: 2,366	File Reading: 2,292
	Average number of positions per account	2	Margin Calc: 1,319	Margin Calc: 1,112

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 OS: Windows Client 10 (22H2) Java: 11.0.21 (Corretto)

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: 9,282	Total: 9,739	Total: 9,243
	Number of accounts	100	File Reading: 8,393	File Reading: 8,867	File Reading: 8,405
	Average number of positions per account	5	Margin Calc: 512	Margin Calc: 433	Margin Calc: 440
2	BPF Target Instrument	7,000	Total: 10,007	Total: 10,548	Total: 9,902
	Number of accounts	200	File Reading: 8,688	File Reading: 9,251	File Reading: 8,701
	Average number of positions per account	5	Margin Calc: 734	Margin Calc: 601	Margin Calc: 596
3	BPF Target Instrument	30,000	Total: 36,870	Total: 36,067	Total: 36,195
	Number of accounts	100	File Reading: 33,636	File Reading: 33,611	File Reading: 33,752
	Average number of positions per account	50	Margin Calc: 2,410	Margin Calc: 1,676	Margin Calc: 1,639
4	BPF Target Instrument	30,000	Total: 45,893	Total: 42,082	Total: 42,020
	Number of accounts	200	File Reading: 38,679	File Reading: 38,416	File Reading: 37,892
	Average number of positions per account	50	Margin Calc: 6,081	Margin Calc: 2,551	Margin Calc: 3,013
5	BPF Target Instrument	1,000	Total: 3,936	Total: 3,733	Total: 3,878
	Number of accounts	100	File Reading: 2,252	File Reading: 2,232	File Reading: 2,247
	Average number of positions per account	20	Margin Calc: 1,149	Margin Calc: 953	Margin Calc: 1,010
6	BPF Target Instrument	1,000	Total: 4,877	Total: 4,293	Total: 4,380
	Number of accounts	200	File Reading: 2,247	File Reading: 2,233	File Reading: 2,171
	Average number of positions per account	20	Margin Calc: 1,884	Margin Calc: 1,278	Margin Calc: 1,411