

Paweł Konopka

# **ICE, gRPC - wartości opcjonalne**

# ICE

## Interfejs

```
module Demo
{
    class MyClass
    {
        int a;
        optional(1) int b;
    }

    interface TestService
    {
        int opInt(int regularIntArg, optional(2) int optionalIntArg);

        int opString(string regularStringArg, optional(2) string
optionalStringArg);

        int opClass(MyClass classArg);
    };
};
```

## Ustawienia serwera

```
"tcp -h 127.0.0.2 -p 10000"
```

## Wireshark

Interfejs: **Loopback:lo**

Kwerenda:

```
ip.addr == 127.0.0.2 && tcp.port == 10000
```

## Zmienne Int

Wywołanie z ustawioną wartością opcjonalną:

```
TestService.opInt(996, 1410)
```

```
Frame 4: 119 bytes on wire (952 bits), 119 bytes captured (952 bits) on interface lo, id 0
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
Transmission Control Protocol, Src Port: 52220, Dst Port: 10000, Seq: 54, Ack: 30, Len: 53
Internet Communications Engine Protocol
```

```
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 53
```

```
  Request Message Body
    Request Identifier: 4
    Object Identity Name: test1
    Object Identity Content: test
    Facet Name: (empty)
    Operation Name: opInt
    Ice::OperationMode: normal (0)
    Invocation Context: (empty)
    Input Parameters Size: 15
    Input Parameters Encoding Major: 1
    Input Parameters Encoding Minor: 1
```

```
  Encapsulated parameters: e40300001282050000
```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 69 95 44 40 00 40 06	a7 47 7f 00 00 01 7f 00	.i.D@.@.G.....
0020	00 02 cb fc 27 10 9d fd	16 e4 50 bd 52 b4 80 18	.....P.R...
0030	02 00 fe 5e 00 00 01 01	08 0a d9 da 93 b1 fb 2f	...^...../
0040	db bd 49 63 65 50 01 00	01 00 00 00 35 00 00 00	..IceP.....5...
0050	04 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	.....tes t1.test.
0060	05 6f 70 49 6e 74 00 00	0f 00 00 00 01 01 e4 03	..opInt.....
0070	00 00 12 82 05 00 00		.....

Wywołanie z pustą wartością opcjonalną:

```
TestService.opInt(1939)
```

```
Frame 18: 114 bytes on wire (912 bits), 114 bytes captured (912 bits) on interface lo, id 0
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
Transmission Control Protocol, Src Port: 52220, Dst Port: 10000, Seq: 107, Ack: 59, Len: 48
Internet Communications Engine Protocol
```

```
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 48
```

```
Request Message Body
  Request Identifier: 5
  Object Identity Name: test1
  Object Identity Content: test
  Facet Name: (empty)
  Operation Name: opInt
  Ice::OperationMode: normal (0)
  Invocation Context: (empty)
  Input Parameters Size: 10
  Input Parameters Encoding Major: 1
  Input Parameters Encoding Minor: 1
```

```
Encapsulated parameters: 93070000
```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 64 95 46 40 00 40 06	a7 4a 7f 00 00 01 7f 00	.d.F@.@.J.....
0020	00 02 cb fc 27 10 9d fd	17 19 50 bd 52 d1 80 18	....'.P.R...
0030	02 00 fe 59 00 00 01 01	08 0a d9 da cd a7 fb 30	...Y.....0
0040	40 f7 49 63 65 50 01 00	01 00 00 00 30 00 00 00	@.IceP...0...
0050	05 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	....tes t1.test.
0060	05 6f 70 49 6e 74 00 00	0a 00 00 00 01 01 93 07	.opInt... ..
0070	00 00		..

## Zmienne String

Wywołanie z ustawioną wartością opcjonalną:

```
TestService.opString("Required-String", "Optional-String")
```

```

> Frame 1754: 146 bytes on wire (1168 bits), 146 bytes captured (1168 bits) on interface lo, id 0
> Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
> Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
> Transmission Control Protocol, Src Port: 48938, Dst Port: 10000, Seq: 67, Ack: 41, Len: 80
> Internet Communications Engine Protocol
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 80
  Request Message Body
    Request Identifier: 2
    Object Identity Name: test1
    Object Identity Content: test
    Facet Name: (empty)
    Operation Name: opString
    Ice::OperationMode: normal (0)
    Invocation Context: (empty)
    Input Parameters Size: 39
    Input Parameters Encoding Major: 1
    Input Parameters Encoding Minor: 1
    Encapsulated parameters: 0f52657175697265642d537472696e67150f4f7074696f6e616c2d537472696e67

```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 84 30 ae 40 00 40 06	0b c3 7f 00 00 01 7f 00	..0.@. ....
0020	00 02 bf 2a 27 10 f8 40	b1 23 01 c3 77 4e 80 18	...'..@.#..wN..
0030	02 00 fe 79 00 00 01 01	08 0a d9 e6 a9 ab fb 3c	...y....<
0040	53 5f 49 63 65 50 01 00	01 00 00 00 50 00 00 00	S_IceP...P...
0050	02 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	.....tes t1.test.
0060	08 6f 70 53 74 72 69 6e	67 00 00 27 00 00 00 01	..opStrin g...'....
0070	01 0f 52 65 71 75 69 72	65 64 2d 53 74 72 69 6e	..Requir ed-Strin
0080	67 15 0f 4f 70 74 69 6f	6e 61 6c 2d 53 74 72 69	g..Optio nal-Stri
0090	6e 67		ng

Wywołanie z pustą wartością opcjonalną:

```
TestService.opString("Required-String")
```

```
Frame 2057: 129 bytes on wire (1032 bits), 129 bytes captured (1032 bits) on interface lo, id 0
Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
Transmission Control Protocol, Src Port: 34794, Dst Port: 10000, Seq: 1, Ack: 15, Len: 63
Internet Communications Engine Protocol
```

```
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 63
```

```
  Request Message Body
    Request Identifier: 1
    Object Identity Name: test1
    Object Identity Content: test
    Facet Name: (empty)
    Operation Name: opString
    Ice::OperationMode: normal (0)
    Invocation Context: (empty)
    Input Parameters Size: 22
    Input Parameters Encoding Major: 1
    Input Parameters Encoding Minor: 1
```

```
  Encapsulated parameters: 0f52657175697265642d537472696e67
```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 73 1f eb 40 00 40 06	1c 97 7f 00 00 01 7f 00	.s..@.@. ....
0020	00 02 87 ea 27 10 06 b2	9a 37 c5 a4 a0 14 80 18	...'...7.....
0030	02 00 fe 68 00 00 01 01	08 0a d9 ea 7f 95 fb 40	...h....@
0040	2c da 49 63 65 50 01 00	01 00 00 00 3f 00 00 00	,.IceP.. ....?
0050	01 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	.....tes t1.test.
0060	08 6f 70 53 74 72 69 6e	67 00 00 16 00 00 00 01	.opStrin g.....
0070	01 0f 52 65 71 75 69 72	65 64 2d 53 74 72 69 6e	.Requir ed-Strin
0080	67		g

## Klasa z wartością opcjonalną jako argument metody

Wywołanie z ustawioną wartością opcjonalną (Python):

```
full_class = Demo.MyClass()
full_class.a = 1
full_class.b = 2
client.test_service.opClass(full_class)
```

```

> Frame 3184: 140 bytes on wire (1120 bits), 140 bytes captured (1120 bits) on interface lo, id 0
> Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
> Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
> Transmission Control Protocol, Src Port: 48198, Dst Port: 10000, Seq: 1, Ack: 15, Len: 74
> Internet Communications Engine Protocol
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 74
  Request Message Body
    Request Identifier: 1
    Object Identity Name: test1
    Object Identity Content: test
    Facet Name: (empty)
    Operation Name: opClass
    Ice::OperationMode: normal (0)
    Invocation Context: (empty)
    Input Parameters Size: 34
    Input Parameters Encoding Major: 1
    Input Parameters Encoding Minor: 1
  Encapsulated parameters: 01250f3a3a44656d6f3a3a4d79436c617373010000000a02000000ff
```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 7e ed e3 40 00 40 06	4e 93 7f 00 00 01 7f 00	~..@.@. N.....
0020	00 02 bc 46 27 10 53 26	02 d5 8c e3 55 2f 80 18	...F'.S& ...U/..
0030	02 00 fe 73 00 00 01 01	08 0a d9 ef 5a 1b fb 45	...s....Z..E
0040	07 5f 49 63 65 50 01 00	01 00 00 00 4a 00 00 00	.._IceP...J...
0050	01 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	.....tes t1.test.
0060	07 6f 70 43 6c 61 73 73	00 00 22 00 00 00 01 01	..opClass ..".....
0070	01 25 0f 3a 3a 44 65 6d	6f 3a 3a 4d 79 43 6c 61	·%·.:Dem o::MyCla
0080	73 73 01 00 00 00 0a 02	00 00 00 ff	ss.....

Wywołanie z pustą wartością opcjonalną (Python):

```
full_class = Demo.MyClass()
full_class.a = 1
client.test_service.opClass(full_class)
```

```
▸ Frame 3473: 134 bytes on wire (1072 bits), 134 bytes captured (1072 bits) on interface lo, id 0
▸ Ethernet II, Src: 00:00:00_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00_00:00:00 (00:00:00:00:00:00)
▸ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.2
▸ Transmission Control Protocol, Src Port: 47726, Dst Port: 10000, Seq: 1, Ack: 15, Len: 68
▾ Internet Communications Engine Protocol
```

```
  Magic Number: IceP
  Protocol Major: 1
  Protocol Minor: 0
  Encoding Major: 1
  Encoding Minor: 0
  Message Type: Request (0)
  Compression Status: Uncompressed, sender cannot accept a compressed reply (0)
  Message Size: 68
```

▾ Request Message Body

```
  Request Identifier: 1
  Object Identity Name: test1
  Object Identity Content: test
  Facet Name: (empty)
  Operation Name: opClass
  Ice::OperationMode: normal (0)
  Invocation Context: (empty)
  Input Parameters Size: 28
  Input Parameters Encoding Major: 1
  Input Parameters Encoding Minor: 1
```

```
  Encapsulated parameters: 01210f3a3a44656d6f3a3a4d79436c61737301000000
```

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 78 0b 01 40 00 40 06	31 7c 7f 00 00 01 7f 00	..x..@.. 1 .....
0020	00 02 ba 6e 27 10 37 21	b4 07 7a 87 be f2 80 18	...n'..7! ..z.....
0030	02 00 fe 6d 00 00 01 01	08 0a d9 f0 bc e8 fb 46	...m.....F
0040	6a 2d 49 63 65 50 01 00	01 00 00 00 44 00 00 00	j-IceP... ..D...
0050	01 00 00 00 05 74 65 73	74 31 04 74 65 73 74 00	.....tes t1.test.
0060	07 6f 70 43 6c 61 73 73	00 00 1c 00 00 00 01 01	..opClass .....
0070	01 21 0f 3a 3a 44 65 6d	6f 3a 3a 4d 79 43 6c 61	..!...:Dem o::MyCla
0080	73 73 01 00 00 00		ss....



# GRPC

## Interfejs

```
syntax = "proto3";

option java_multiple_files = true;
option java_package = "Demo";
option java_outer_classname = "DemoProto";

enum MyEnum {
    FIRST_OPTION = 0;
    SECOND_OPTION = 1;
    THIRD_OPTION = 2;
}

message IntArgs {
    int32 intArg1 = 1;
    int32 intArg2 = 2;
}

message StringArgs {
    string stringArg1 = 1;
    string stringArg2 = 2;
}

message EnumArgs {
    MyEnum enumArg1 = 1;
    MyEnum enumArg2 = 2;
}

message Response {}

service DemoService {
    rpc opInt (IntArgs) returns (Response) {};
    rpc opString (StringArgs) returns (Response) {};
    rpc opEnum (EnumArgs) returns (Response) {};
}
```

## Zmienne Int

Wywołanie z ustawionymi obiema wartościami:

```
service_stub.opInt(IntArgs(intArg1=996, intArg2=1410))
```

▼ GRPC Message: /DemoService/opInt, Request  
Compressed Flag: Not Compressed (0)  
Message Length: 6  
Message Data: 6 bytes

▼ Protocol Buffers: /DemoService/opInt,request

▼ Message: IntArgs  
Field(1): intArg1 = 996 (int32)  
Field(2): intArg2 = 1410 (int32)

▸ Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 73 04 96 40 00 40 06	37 ec 7f 00 00 01 7f 00	.s..@.@.7.....
0020	00 02 b1 80 27 11 30 e5	ac f6 dc 7e 78 36 80 18	....'.0.~x6..
0030	02 00 fe 68 00 00 01 01	08 0a da 4b 6f bb fb a0	...h.....Ko..
0040	d0 72 00 00 08 01 04 00	00 00 05 c3 c2 83 86 c1	.r.....
0050	c0 bf be 00 00 04 08 00	00 00 00 05 00 00 00 05	.....
0060	00 00 0b 00 01 00 00 00	05 00 00 00 00 06 08 e4	.....
0070	07 10 82 0b 00 00 04 08	00 00 00 00 00 00 00 00	.....
0080	05		.

Wywołanie z ustawioną tylko jedną wartością:

```
service_stub.opInt(IntArgs(intArg1=420))
```

▼ GRPC Message: /DemoService/opInt, Request  
Compressed Flag: Not Compressed (0)  
Message Length: 3  
Message Data: 3 bytes

▼ Protocol Buffers: /DemoService/opInt,request

▼ Message: IntArgs  
Field(1): intArg1 = 420 (int32)

▸ Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 70 04 9a 40 00 40 06	37 eb 7f 00 00 01 7f 00	.p..@.@.7.....
0020	00 02 b1 80 27 11 30 e5	ad 46 dc 7e 78 6c 80 18	....'.0.·F~xl..
0030	02 00 fe 65 00 00 01 01	08 0a da 50 78 e1 fb a1	...e.....Px..
0040	1d 0f 00 00 08 01 04 00	00 00 07 c3 c2 83 86 c1	.....
0050	c0 bf be 00 00 04 08 00	00 00 00 07 00 00 00 05	.....
0060	00 00 08 00 01 00 00 00	07 00 00 00 00 03 08 a4	.....
0070	03 00 00 04 08 00 00 00	00 00 00 00 00 05	.....

## Zmienne String

Wywołanie z ustawionymi obiema wartościami:

```
service_stub.opString(StringArgs(  
    stringArg1="Hello, ",  
    stringArg2="World!",  
))
```

▼ GRPC Message: /DemoService/opString, Request  
Compressed Flag: Not Compressed (0)  
Message Length: 17  
Message Data: 17 bytes

▼ Protocol Buffers: /DemoService/opString,request  
▼ Message: StringArgs  
Field(1): stringArg1 = Hello, (string)  
Field(2): stringArg2 = World! (string)  
▶ Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 9a 04 9e 40 00 40 06	37 bd 7f 00 00 01 7f 00	...@.@. 7.....
0020	00 02 b1 80 27 11 30 e5	ad 93 dc 7e 78 a2 80 18	...'.0. ...~x...
0030	02 00 fe 8f 00 00 01 01	08 0a da 52 dd a4 fb a6	.....R.....
0040	26 2b 00 00 24 01 04 00	00 00 09 40 05 3a 70 61	&+..\$. ...@.:pa
0050	74 68 15 2f 44 65 6d 6f	53 65 72 76 69 63 65 2f	th./Demo Service/
0060	6f 70 53 74 72 69 6e 67	c3 83 86 c2 c1 c0 bf 00	opString .....
0070	00 04 08 00 00 00 00 09	00 00 00 05 00 00 16 00	.....
0080	01 00 00 00 09 00 00 00	00 11 0a 07 48 65 6c 6c	.....Hell
0090	6f 2c 20 12 06 57 6f 72	6c 64 21 00 00 04 08 00	o, ..Wor ld!.....
00a0	00 00 00 00 00 00 00 05		.....

Wywołanie z ustawioną tylko jedną wartością:

```
service_stub.opString(StringArgs(stringArg1="Hello!"))
```

▼ GRPC Message: /DemoService/opString, Request  
Compressed Flag: Not Compressed (0)  
Message Length: 8  
Message Data: 8 bytes

▼ Protocol Buffers: /DemoService/opString,request  
▼ Message: StringArgs  
Field(1): stringArg1 = Hello! (string)  
▶ Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 75 04 a2 40 00 40 06	37 de 7f 00 00 01 7f 00	.u.@.@. 7.....
0020	00 02 b1 80 27 11 30 e5	ae 0a dc 7e 78 d8 80 18	...'.0. ...~x...
0030	02 00 fe 6a 00 00 01 01	08 0a da 53 66 ee fb a8	...j.....Sf...
0040	8a f0 00 00 08 01 04 00	00 00 0b be c3 83 86 c2	.....
0050	c1 c0 bf 00 00 04 08 00	00 00 00 0b 00 00 00 05	.....
0060	00 00 0d 00 01 00 00 00	0b 00 00 00 00 08 0a 06	.....
0070	48 65 6c 6c 6f 21 00 00	04 08 00 00 00 00 00 00	Hello!.....
0080	00 00 05		...

## Wartości Enum

Wywołanie z ustawionymi obiema wartościami:

```
service_stub.opEnum(EnumArgs(  
    enumArg1=MyEnum.SECOND_OPTION,  
    enumArg2=MyEnum.THIRD_OPTION,  
))
```

- GRPC Message: /DemoService/opEnum, Request
  - Compressed Flag: Not Compressed (0)
  - Message Length: 4
  - Message Data: 4 bytes
- Protocol Buffers: /DemoService/opEnum,request
  - Message: EnumArgs
    - Field(1): enumArg1 = SECOND\_OPTION(1) (enum)
    - Field(2): enumArg2 = THIRD\_OPTION(2) (enum)
  - Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 8b 04 a6 40 00 40 06	37 c4 7f 00 00 01 7f 00	...@.@. 7.....
0020	00 02 b1 80 27 11 30 e5	ae 5c dc 7e 79 0e 80 18	...'0. \.~y...
0030	02 00 fe 80 00 00 01 01	08 0a da 58 39 cf fb a9	.....X9...
0040	14 3e 00 00 22 01 04 00	00 00 0d 40 05 3a 70 61	.>..."...@.:pa
0050	74 68 13 2f 44 65 6d 6f	53 65 72 76 69 63 65 2f	th./Demo Service/
0060	6f 70 45 6e 75 6d c4 83	86 c3 c2 c1 c0 00 00 04	opEnum.....
0070	08 00 00 00 00 0d 00 00	00 05 00 00 09 00 01 00	.....
0080	00 00 0d 00 00 00 04	08 01 10 02 00 00 04 08	.....
0090	00 00 00 00 00 00 00 00	05	.....

Wywołanie z ustawioną tylko jedną wartością:

```
service_stub.opEnum(EnumArgs(  
    enumArg1=MyEnum.SECOND_OPTION,  
))
```

- GRPC Message: /DemoService/opEnum, Request
  - Compressed Flag: Not Compressed (0)
  - Message Length: 2
  - Message Data: 2 bytes
- Protocol Buffers: /DemoService/opEnum,request
  - Message: EnumArgs
    - Field(1): enumArg1 = SECOND\_OPTION(1) (enum)
  - Stream: WINDOW\_UPDATE, Stream ID: 0, Length 4

0000	00 00 00 00 00 00 00 00	00 00 00 00 08 00 45 00	.....E.
0010	00 6f 04 aa 40 00 40 06	37 dc 7f 00 00 01 7f 00	.o..@.@. 7.....
0020	00 02 b1 80 27 11 30 e5	ae c4 dc 7e 79 44 80 18	...'0. ....~yD..
0030	02 00 fe 64 00 00 01 01	08 0a da 58 ed 6b fb ad	...d.....X.k..
0040	e7 23 00 00 08 01 04 00	00 00 0f be c4 83 86 c3	.#.....
0050	c2 c1 c0 00 00 04 08 00	00 00 00 0f 00 00 00 05	.....
0060	00 00 07 00 01 00 00 00	0f 00 00 00 00 02 08 01	.....
0070	00 00 04 08 00 00 00 00	00 00 00 00 05	.....