

ING Honours project - protocol specification

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Revision History

Revision	Date	Author(s)	Description
0.1	2017/04/24	djhuistra	First draft
0.2	2017/05/02	djhuistra	Camera ready version
0.3	2017/05/09	djhuistra	Two consistency fixes and two new methods. See changelog for more details.
1.0	2017/06/01	djhuistra	Release candidate! Methods returns now consistent. Fixed several examples. See changelog for more details.
1.1	2017/06/06	djhuistra	PIN card and PIN code numbers now Strings in all methods

Contents

1. Introduction	4
1.1. JSON-RPC Request	4
1.2. JSON-RPC Response	4
2. Methods	5
2.1. Account Module	5
2.1.1. openAccount	5
2.1.2. openAdditionalAccount	7
2.1.3. closeAccount	8
2.2. Access Module	9
2.2.1. provideAccess	9
2.2.2. revokeAccess	10
2.3. Transfer Module	11
2.3.1. depositIntoAccount	11
2.3.2. payFromAccount	12
2.3.3. transferMoney	13
2.4. Authentication Module	14
2.4.1. getAuthToken	14
2.5. Info Module	15
2.5.1. getBalance	15
2.5.2. getTransactionsOverview	16
2.5.3. getUserAccess	17
2.5.4. getBankAccountAccess	18
A. The Error object	20
A.1. Known Error Codes	20
A.2. Examples	20
B. Change log	21
B.1. version 0.3	21
B.2. version 1.0	21
B.3. version 1.1	21

1. Introduction

This document describes the JSON-RPC 2.0 protocol used in the ING Honours project. It should guide you through the different exposed methods and provide basic pointers to help you to implement a program that communicates using this protocol.

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

1.1. JSON-RPC Request

In order to execute a remote procedure, you must send an HTTP POST request, containing a json dictionary in compliance to the JSON-RPC 2.0 specification[1]. This implies that each request dictionary must at least contain the following keys:

jsonrpc A String specifying the version of the JSON-RPC protocol. This field **MUST** be exactly "2.0" in order to use JSON-RPC 2.0 features.

method A String containing the name of the method to be invoked.

params A Structured value that holds the parameter values to be used during the invocation of the method. If a method does not require any parameters, an empty array **MUST** be included.

id An identifier established by the Client that **MUST** contain a String or Number. Numbers **SHOULD NOT** contain fractional parts.

The 'id' and 'jsonrpc' fields are omitted in all examples.

1.2. JSON-RPC Response

After sending a request, a response object will be returned. The response object consists of a json dictionary containing the following keys:

jsonrpc A String specifying the version of the JSON-RPC protocol.

result The value of this member is determined by the method invoked on the Server.

error This member only exists if an error has occurred. The structure of this member is defined in Appendix A. If no error has occurred, this member **MAY** also be null.

id This member contains the value of the id member in the Request Object. If the id could not be parsed due to a parse error, it will be set to null.

The 'id' and 'jsonrpc' fields are omitted in all examples.

2. Methods

The protocol contains different methods. These methods are all grouped into modules. A module contains the methods involving a specific part of the functionality.

2.1. Account Module

2.1.1. openAccount

Method openAccount

Description Open a bank account. This method also creates a CustomerAccount and PIN card for this account.

Authentication (none)

Parameters This method accepts the following parameters:

name Customer name

surname Customer surname

initials Customer initials

dob Customer date of birth

ssn Customer SSN

address Customer address

telephoneNumber Customer telephoneNumber

email Customer email

username Customer username

password Customer password

Returns A dictionary containing the following members:

iBAN (String) The number of the created bank account

pinCard (String) The number of the created pin card

pinCode (String) The pin code of the created pin card

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.

Example

```
--> {"method": "openAccount",
      "params": {
        "name": "Duck",
        "surname": "Donald",
        "initials": "D",
        "dob": "1954-02-19",
        "ssn": "571376046",
        "address": "1313 Webfoot Walk, Duckburg",
        "telephoneNumber": "+316 12345678",
        "email": "donald@gmail.com",
        "username": "duckd",
        "password": "kwikkwekkwak",
      }}
<-- {"result": {
      "iBAN": "NL69INGB0123456789",
      "pinCard": 1234,
      "pinCode": 1234,
    }}
```

2.1.2. openAdditionalAccount

Method openAdditionalAccount

Description Open an additional account for an existing customer. Also creates a PIN card for this account.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

Returns A dictionary containing the following members:

iBAN (String) The number of the created bank account

pinCard (String) The number of the created pin card

pinCode (String) The pin code of the created pin card

Errors NotAuthorizedError: The authenticated user is not authorized to perform this action.
Example

```
--> {"method":"openAdditionalAccount",
      "params":{"
        "authToken": "some.long.auth.token!%&...",
      }}
<-- {"result": {
      "iBAN": "NL69INGB0123456789",
      "pinCard": "1234",
      "pinCode": "1234",
    }}
```

2.1.3. closeAccount

Method closeAccount

Description Close a bank account. Also invalidates the corresponding pin card. If this is the customers last bank account, it also closes the customer account.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN (String) The number of the bank account

Returns An empty dictionary if successful

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example

```
--> {"method":"closeAccount",
      "params":{"
        "authToken": "some.long.auth.token!%&...",
        "iBAN": "NL69INGB0123456789",
      }}
<-- {"result": {}}
```


2.2. Access Module

2.2.1. provideAccess

Method provideAccess

Description A customer can share access to one of his bank accounts with another customer. This also creates a corresponding PIN card.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN (String) The number of the bank account

username The username of customer that should get access

Returns A dictionary containing the following members:

pinCard (String) The number of the created pin card

pinCode (String) The pin code of the created pin card

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.

NotAuthorizedError: The authenticated user is not authorized to perform this action.

NoEffectError: The action has no effect. See message. (e.g. access has already been given)

Example

```
--> {"method": "provideAccess",
      "params": [
        "authToken": "some.long.auth.token!%&...",
        "iBAN": "NL69INGB0123456789",
        "username": "daisyduck"
      ]}
<-- {"result": {
      "pinCard": "2345",
      "pinCode": "2345",
    }}
```

2.2.2. revokeAccess

Method revokeAccess

Description A customer can revoke his access to a bank account if he is not the primary holder, otherwise the customer can revoke another customers access.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN (String) The number of the bank account

username (optional) The username of customer whoms access should be revoked

Returns An empty dictionary if successful

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.
NoEffectError: The action has no effect. See message. (e.g. username did not have access)

Example

```
--> {"method": "revokeAccess",  
      "params": {  
        "authToken": "some.long.auth.token!%&...",  
        "iBAN": "NL69INGB0123456789",  
        "username": "daisyduck"  
      }}  
<-- {"result": {}}
```

2.3. Transfer Module

2.3.1. depositIntoAccount

Method depositIntoAccount

Description Deposit money into a bank account.

Authentication REQUIRED (pin)

Parameters This method accepts the following parameters:

iBAN The number of the bank account

pinCard (String) The number of the pin card

pinCode (String) The code of the pin card

amount The amount that is deposited.

Returns An empty dictionary if successful

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
InvalidPINError: An invalid PINcard, -code or -combination was used.

Example

```
--> {"method":"depositIntoAccount",
      "params":{"
        "iBAN": "NL69INGB0123456789",
        "pinCard": "1234",
        "pinCode": "1234",
        "amount": 313,00
      }}
<-- {"result": {}}
```

2.3.2. payFromAccount

Method payFromAccount

Description Pay from bank account

Authentication REQUIRED (pin)

Parameters This method accepts the following parameters:

sourceIBAN (String) The number of the bank account

targetIBAN (String) The number of the target bank account

pinCard (String) The number of the pin card

pinCode (String) The code of the pin card

amount The amount that is deposited.

Returns An empty dictionary if successful

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
InvalidPINError: An invalid PINcard, -code or -combination was used.

Example

```
--> {"method": "payFromAccount",  
      "params": {  
        "sourceIBAN": "NL69INGB0123456789",  
        "targetIBAN": "NL98INGB1234567890",  
        "pinCard": "1234",  
        "pinCode": "1234",  
        "amount": 313,00  
      }}  
<-- {"result": {}}
```

2.3.3. transferMoney

Method transferMoney

Description Transfer money between two bank accounts.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

sourceIBAN The number of the bank account

targetIBAN The number of the target bank account

targetName The name of the target bank account holder

amount The amount that is deposited.

description Description of the transaction.

Returns An empty dictionary if successful

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example (per execution: with jsonrpc and id tag).

```
--> {"jsonrpc": "2.0", "method": "transferMoney", "id": 1,
    "params": {
        "authToken": "some.long.auth.token!%&...",
        "sourceIBAN": "NL69INGB0123456789",
        "targetIBAN": "NL98INGB1234567890",
        "targetName": "Donald D. Duck",
        "amount": 313,00,
        "description": "Some description"
    }}
<-- {"jsonrpc": "2.0", "result": {}, "id": 1}
```

2.4. Authentication Module

2.4.1. getAuthToken

Method getAuthToken

Description Attempts to log in and returns an authentication token.

Authentication (none)

Parameters This method accepts the following parameters:

username The username of the customer

password The password of the customer

Returns A dictionary containing the following members:

authToken The authToken string

Errors AuthenticationError: The user could not be authenticated. Invalid username, password or combination.

Example

```
--> {"method": "getAuthToken",  
      "params": {  
        "username": "duckd",  
        "password": "kwikkwekkwak",  
      }}  
<-- {"result": {"authToken": "some.long.auth.token!%&..."}}
```

2.5. Info Module

2.5.1. getBalance

Method getBalance

Description Retrieves the balance of a bank account.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN The number of the bank account

Returns A dictionary containing the following members:

balance The balance of the account

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example

```
--> {"method": "getBalance",  
    "params": {  
        "authToken": "some.long.auth.token!%&...",  
        "iBAN": "NL69INGB0123456789",  
    }}  
<-- {"result": {"balance": -2000,00}}
```

2.5.2. getTransactionsOverview

Method getTransactionsOverview

Description Retrieves overview of recent transactions of a bank account.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN The number of the bank account

nrOfTransactions The number of transactions requested

Returns An array of dictionaries containing the following members:

sourceIBAN The number of the source bank account

targetIBAN The number of the target bank account

targetName The name of the target bank account holder

date The date of the transaction

amount The amount transferred

description Description of the transaction

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example

```
--> {"method": "getTransactionsOverview",
      "params": {
        "authToken": "some.long.auth.token!%&...",
        "iBAN": "NL69INGB0123456789",
        "nrOfTransactions": 1,
      }}
<-- {"result": [{
  "sourceIBAN": "NL69INGB0123456789",
  "targetIBAN": "NL98INGB1234567890",
  "targetName": "Donald D. Duck",
  "date": "2014-07-02T018:00:00+02:00",
  "amount": 5.00,
  "description": "Salary"
}, {...}, {...}]}
```


2.5.3. getUserAccess

Method getUserAccess

Description Retrieves an overview of all bank accounts a user has access to. User can only request this for himself.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

Returns An array of dictionaries containing the following members:

iBAN The IBAN of the bank account.

owner The username of the accounts owner.

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example

```
--> {"method": "getUserAccess",  
    "params": {  
        "authToken": "some.long.auth.token!%&..."  
    }}  
<-- {"result": [{  
    "iBAN": "NL69INGB0123456789",  
    "owner": "duckd"  
}, {...}, {...}]}
```

2.5.4. getBankAccountAccess

Method getBankAccountAccess

Description Retrieves an overview of all users who have access to a bank account. Only the owner of an account can perform this request.

Authentication REQUIRED (account)

Parameters This method accepts the following parameters:

authToken The authentication token, obtained with getAuthToken

iBAN The IBAN of the bank account.

Returns An array of dictionaries containing the following members:

username The username of a UserAccount that has access to this bank account.

Errors InvalidParamValueError: One or more parameter has an invalid value. See message.
NotAuthorizedError: The authenticated user is not authorized to perform this action.

Example

```
--> {"method": "getBankAccountAccess",
      "params": {
        "authToken": "some.long.auth.token!%&...",
        "iBAN": "NL69INGB0123456789",
      }}
<-- {"result": [{
      "username": "duckd"
    }, {...}, {...}]}
```

Bibliography

- [1] JSON-RPC Working Group (2010), JSON-RPC 2.0 specification.
Available at <http://www.jsonrpc.org/specification>

A. The Error object

An Error object has the following fields[1]:

code A Number that indicates the error type that occurred. This MUST be an integer.

message A String providing a short description of the error. The message SHOULD be limited to a concise single sentence.

data A value that contains additional information about the error. The value of this member is defined by the Server, this member MAY be omitted.

A.1. Known Error Codes

Error Code	Name	Description
418	InvalidParamValueError	One or more parameter has an invalid value. See message.
419	NotAuthorizedError	The authenticated user is not authorized to perform this action.
420	NoEffectError	The action has no effect. See message.
421	InvalidPINError	An invalid PINcard, -code or -combination was used.
422	AuthenticationError	The user could not be authenticated. Invalid username, password or combination.
500	OtherError	An unexpected error occurred, see error details.
-32700	ParseError	An error occurred while parsing the JSON input.
-32600	InvalidRequestError	The received JSON is not a valid JSON-RPC Request.
-32601	MethodNotFoundError	The requested remote-procedure does not exist.
-32602	InvalidParamsError	Invalid method parameters.
-32603	ServerError	Internal JSON-RPC error.

Table A.1.: Overview of different errors.

A.2. Examples

```
--> { "method": "foobar" }
<-- { "error": { "code": -32601, "message": "Method not found" } }
```

```
--> { "method": "getBalance", "params": { "authToken": "some.long.auth.token
!%&...", "iBAN": "NL00INGB0123456789" } }
<-- { "error": { "code": 418, "message": "One or more parameter has an invalid
value.", "data": "IBAN does not exist" } }
```

B. Change log

An overview of changes per version

B.1. version 0.3

- **2.1.2** openAdditionalAccount now has NotAuthorizedError
- **2.1.3** closeAccount paramter name change: bankAccountNumber to iBAN
- **2.5** Info module: Two additional info methods added. getUserAccess and getBankAccountAccess
- **2.3.2** Example fixed. return parameter amount was capitalized.

B.2. version 1.0

- **All methods** All methods now return an (empty) dictionary or an array of dictionaries instead of a single value
- **2.5.3** getUserAccess no longer requires username parameter.
- **2.1.1** Example fixed. Several parameter values did not have quotation marks
- **2.3.1** Example fixed. return parameter amount was capitalized.
- **2.3.2** Example fixed. return parameter amount was capitalized.

B.3. version 1.1

- **All methods** pinCode and PinCard numbers changed to String
- **2.3.2** Example (finally) fixed. return parameter amount was capitalized.