



Mustangserver  
**Manual**

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# Chapter 1. In case of technical questions

Please contact

[support@mustangserver.com](mailto:support@mustangserver.com)

The status (e.g. upcoming maintenances) of the server is available on it's [status page](#).

## Chapter 2. Server access

User access to the web interface is possible via <https://api.usegroup.de/>. Terms of service are listed in the chapter [Terms of service](#).

To register please access the [Mustangserver signup page](#)

select a desired username, enter your email and click the "send" button on the bottom left.

You will receive a mail with a activation link you have to access to activate your free 4 week evaluation period. If you do not react on reminder emails your account will expire after your evaluation.

Afterwards you can login on <https://api.usegroup.de/devportal/>.

You will need it your username in order to log in and in case you want to reset your password, both are *not possible using your email address*. In case you forgot your username feel free to inquire at [info@mustangproject.org](mailto:info@mustangproject.org) using the email address you are requesting the username for. This username does not have anything to do with optional username parameters mentioned below.

After being logged in you need to register your interest, i.e. „subscribe“ to the APIs you require.

If you select the desired Mustangserver version and click on the blue "try out" button (not the link in the navigation) on the next page you should be able to click a "get test key" button.

### A screenshot

The screenshot displays the Mustangserver API Manager interface. The top navigation bar includes 'API MANAGER', 'APIs', 'Applications', and a search bar. The left sidebar contains navigation links for Overview, Subscriptions, Try Out, Comments, Documentation, and SDKs. The main content area shows the 'Overview' page for the 'Mustangserver' API (Version v0.4.0, By admin). A 'TRY OUT' button is visible next to the API URL. Below this, there are four business plan options: Bronze (1000 Requests/min), Gold (5000 Requests/min), Silver (2000 Requests/min), and Unlimited (Unlimited Requests/min). The 'Comments' section shows 'No Comments Yet'.

e.g. when you open the "ping" operation and click "try it out" and "execute" you should get a "pong" response.

You can always change your password on <https://api.usegroup.de/devportal/settings/change-password/>

There is a optional „username“ field for all operations: Please ignore it. It serves as a placeholder where the API management transmits your username, if it were set by any application the value would be overwritten anyway.

# Chapter 3. Authentication

## 3.1. OAuth2

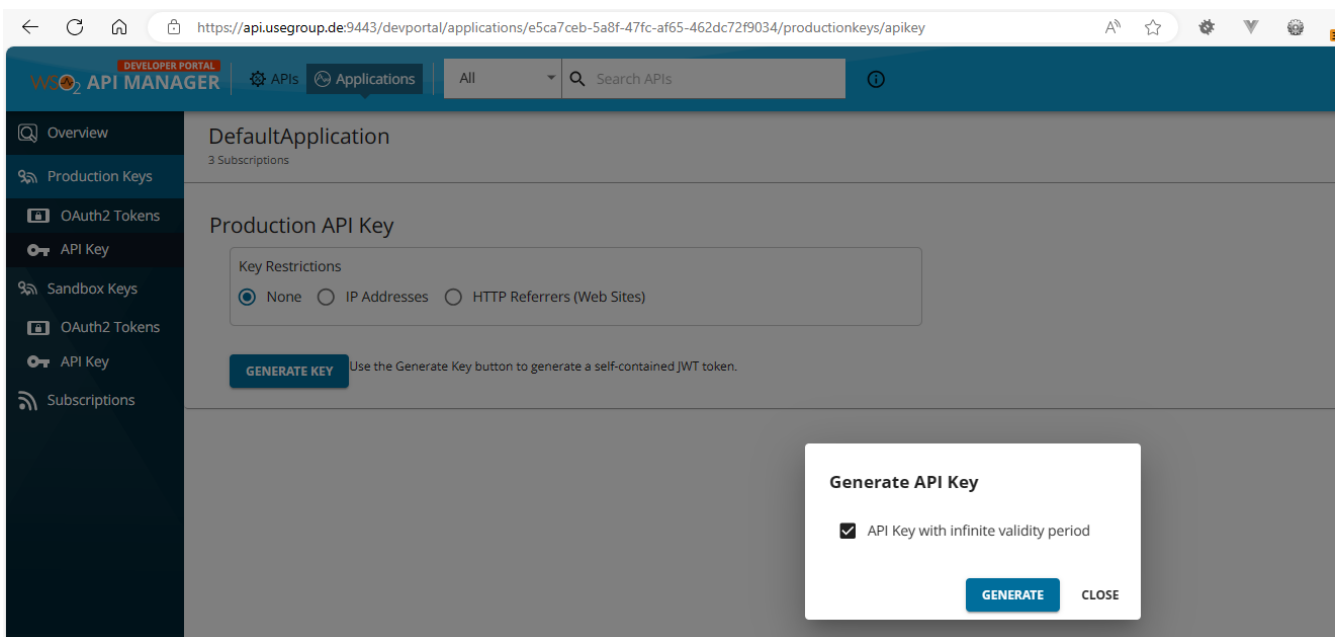
First of all you will have to subscribe to the API. You can manage your subscriptions in the left navigation of the devportal but it's often easiest to subscribe via overview|try out, which also allows you to try it.

Then you will have to enable client credentials in the applications tab, <https://api.usegroup.de:9443/devportal/applications> Default Application, Oauth2 tokens. The procedure is described more detailed in the [PHP tutorial](#) but is generic to all examples and does not apply for PHP only.

Please note that most clients will use the Mustangserver version which had been *selected* in the backend when downloading the OpenAPI definition. Feel free to replace /mustang/<version>/mustang by as described in [Endpoint for most-recent API versions](#).

## 3.2. Api Key

In the [applications tab](#), select Default Application, Oauth2 tokens, Production Keys, API Key. Select according restrictions if required, click Generate Key, select lifetime and click generate. Copy&safely store the generated key.



API key can be used e.g. within [Bruno](#).

The screenshot shows the Bruno API client interface. On the left, there is a sidebar with a collection named 'Mustangserver' containing several endpoints, including 'GET Healthcheck...'. The main panel displays the details for the selected endpoint, showing the URL 'https://gw.usegroup.de:8243/mustang/mustang/ping' and the 'Headers' tab. A table lists the headers, with one entry: 'apikey' with the value '<paste here>'. Below the table is a '+ Add Header' button.

Within PHP you also might pass just as additional header attribute making your source code look like

```
<?php
require_once(__DIR__ . '/vendor/autoload.php');
$apikey="<your key>";
$config = Swagger\Client\Configuration::getDefaultConfiguration();
$gc=new GuzzleHttp\Client(['headers' => ['apikey' => $apikey]]);
$apiInstance = new Swagger\Client\Api\MustangControllerApi($gc,$config);
try {
$result = $apiInstance->ping();
print_r($result);
} catch (Exception $e) {
http_response_code(500);
echo 'Exception when calling ErrorControllerApi->handle: ',
$e->getMessage(), PHP_EOL;
}
```

# Chapter 4. Endpoint for most-recent API versions

If you leave out the version number in the request to the gateway you will always be using the latest recommended (usually the latest) version. In that case e.g. your „ping“ endpoint changes from <https://gw.usegroup.de:8243/mustang/1.0.0/mustang/ping> to <https://gw.usegroup.de:8243/mustang/mustang/ping> .

New versions may be retired as soon as six month after release of the successor. It is possible to always use the latest (more precisely: recommended) version by removing the version from the endpoint. This is an example of the validate endpoint:

```
- ..... "https://gw.usegroup.de:8243/mustang/v0.5.0/mustang/validate",  
+ ..... "https://gw.usegroup.de:8243/mustang/mustang/validate",
```

## Note

Our API keys are JWTs (JSON Web Tokens) which encode the subscriptions at the time of the creation of the key, and that a newer version will require a new subscription (to that version), i.e. you should not use the most recent version in conjunction with API keys because you will require new API keys for new versions. You may receive 403 unauthorized and/or 900908 Resource forbidden errors if you try to access a too recent resource with a API key too old.

# Chapter 5. Errors and Exceptions

In case of an exception Mustangserver will return a http status code of 400 and the message of the Exception will be returned in the „message“ field of the according JSON.

```
{
  "requestUrl": "http://127.0.0.1:8000/mustang/combineXML",
  "httpCode": 400,
  "errorCode": "MSE1000:Unbekannte Fehler während der Request
Ausführung!",
  "message": "File is not a valid PDF/A-1 input file"
}
```

# Chapter 6. Mediation, Transformation and Orchestration

The <http://api.usegroup.de/> uses WSO<sup>2</sup> as API management which in turn uses Apache Synapse (<https://synapse.apache.org/>) for mediation/transformation/orchestration. This means that mediation and orchestration can be developed e.g. in WSO<sup>2</sup>'s Integration Studio (<https://wso2.com/integration/integration-studio/>) and uploaded as XML file. Apart from acting as a load balancer and central authentication this allow to

- override certain states in the process, e.g. implement a timeout after a certain number of seconds
- invoke a chain of operations in only one virtual endpoint, e.g. conversion from plain PDF, parallelly converting invoice data to XML, merging PDF/A and XML and validation thereof and/or
- map any custom specific input- or output parameter to the values used by Mustangserver internally

# Chapter 7. Document types

## 7.1. Invoice

The invoice has a „documentCode“ attribute of 380.

## 7.2. Cancellation

A cancellation has a „documentCode“ attribute of 381.

## 7.3. Corrected Invoice

A corrected invoice has a „documentCode“ attribute of 384. Please note that amounts are usually negative, so this is a minimal example for a corrected invoice:

```
{
  "documentCode": "384",
  "number": "471102",
  "currency": "EUR",
  "issueDate": "2018-03-04T00:00:00.000+01:00",
  "dueDate": "2018-03-04T00:00:00.000+01:00",
  "deliveryDate": "2018-03-04T00:00:00.000+01:00",
  "sender": {
    "name": "Lieferant GmbH",
    "zip": "80333",
    "street": "Lieferantenstraße 20",
    "location": "München",
    "country": "DE",
    "taxID": "201/113/40209",
    "vatID": "DE123456789",
    "globalID": "4000001123452",
    "globalIDScheme": "0088"
  },
  "recipient": {
    "name": "Kunden AG Mitte",
    "zip": "69876",
    "street": "Kundenstraße 15",
    "location": "Frankfurt",
    "country": "DE"
  },
  "zfitems": [
    {
      "price": 9.9,
      "quantity": -20,
      "product": {
        "unit": "H87",
        "name": "Trennblätter A4",
        "description": ""
      }
    }
  ]
}
```

```
"vatpercent": 19,  
"taxCategoryCode": "S"  
},  
{  
"price": 5.5,  
"quantity": -50,  
"product": {  
"unit": "H87",  
"name": "Joghurt Banane",  
"description": "",  
"vatpercent": 7,  
"taxCategoryCode": "S"  
}  
}  
]  
}
```

## 7.4. Credit Note

A credit note has a „documentCode“ attribute of 389.

# Chapter 8. Classes

Mustangserver has two important main classes, `invoice` and `calculatedInvoice`. `Invoice` contains trade party classes for recipients and senders and item classes which in turn contain instances of product classes.

The difference between `invoice` and `calculatedInvoice` is that the latter contains (redundant, because calculatable) properties like `grandTotal`. These attributes are provided for courtesy when reading invoices but are *not required* when writing. However, if they are present when writing (e.g. `combine` or `invoice2XML`) they will raise an error if the invoice calculation does not match. This can be useful when a PDF file has been generated with another process and the `Factur-X-XML` is supposed to have the same values, in which case the PDF values can be provided because an error would be more helpful than a silently incorrect `Factur-X` file because the PDF has been calculated incorrectly, or uses features not yet available in Mustangserver.

## 8.1. Invoice class

The invoice class is used for all document types.

### 8.1.1. Invoice

#### Minimal example

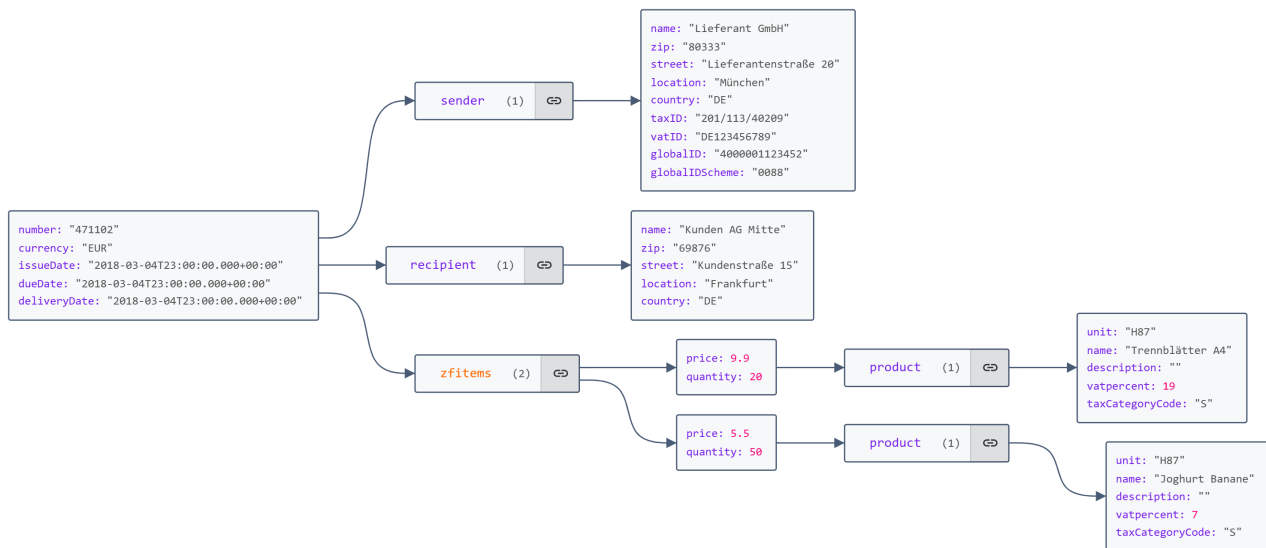
```
{
  "number": "471102",
  "currency": "EUR",
  "issueDate": "2018-03-04T00:00:00.000+01:00",
  "dueDate": "2018-03-04T00:00:00.000+01:00",
  "deliveryDate": "2018-03-04T00:00:00.000+01:00",
  "sender": {
    "name": "Lieferant GmbH",
    "zip": "80333",
    "street": "Lieferantenstraße 20",
    "location": "München",
    "country": "DE",
    "taxID": "201/113/40209",
    "vatID": "DE123456789",
    "globalID": "4000001123452",
    "globalIDScheme": "0088"
  },
  "recipient": {
    "name": "Kunden AG Mitte",
    "zip": "69876",
    "street": "Kundenstraße 15",
    "location": "Frankfurt",
    "country": "DE"
  },
  "zfitems": [
```

```

{
  "price": 9.9,
  "quantity": 20,
  "product": {
    "unit": "H87",
    "name": "Trennblätter A4",
    "description": "",
    "vatpercent": 19,
    "taxCategoryCode": "S"
  }
},
{
  "price": 5.5,
  "quantity": 50,
  "product": {
    "unit": "H87",
    "name": "Joghurt Banane",
    "description": "",
    "vatpercent": 7,
    "taxCategoryCode": "S"
  }
}
]
}

```

### Sample JSON structure to write invoices



### Comprehensive example

```

{
  "documentCode": "380",
  "number": "Test_EeISI_100",
  "referenceNumber": "123",
  "buyerOrderReferencedDocumentID": "abc",

```

```

"currency": "EUR",
"paymentTermDescription": "total amount",
"issueDate": "2018-11-11T23:00:00.000+00:00",
"dueDate": "2018-11-29T23:00:00.000+00:00",
"deliveryDate": "2018-12-03T23:00:00.000+00:00",
"sender": {
  "name": "Seller name",
  "zip": "12345",
  "street": "Seller address line 1",
  "location": "Seller city",
  "country": "DE",
  "taxID": "DE49294093",
  "vatID": "DE12345677",
  "description": "Seller additional legal information",
  "additionalAddress": "Seller address line 2",
  "additionalAddressExtension": "Seller address line 3",
  "debitDetails": [
    {
      "mandate": "Mandate reference identifier",
      "paymentMeansCode": "4",
      "paymentMeansInformation": "SEPA",
      "iban": "IT1212341234123412"
    }
  ],
  "contact": {
    "name": "Seller contact point",
    "phone": "+41 345 654455",
    "email": "seller@contact.de"
  },
  "vatid": "DE12345677",
  "legalOrganisation": {
    "tradingBusinessName": "Seller trading name"
  },
  "globalID": "Seller identifier 2",
  "globalIDScheme": "0110",
  "email": "Seller electronic address"
},
"recipient": {
  "name": "Buyer name",
  "zip": "34562",
  "street": "Buyer address line 1",
  "location": "Buyer city",
  "country": "IE",
  "vatID": "IE394838894",
  "additionalAddress": "Buyer address line 2",
  "additionalAddressExtension": "Buyer address line 3",
  "bankDetails": [
    {
      "accountName": "Payment account name",
      "paymentMeansCode": "58",
      "paymentMeansInformation": "SEPA credit transfer",

```

```

    "iban": "IT1212341234123412"
  }
],
"contact": {
  "name": "Buyer contact point",
  "phone": "+353 2948584",
  "email": "buyer@contact.ie"
},
"vatid": "IE394838894",
"legalOrganisation": {
  "tradingBusinessName": "Buyer trading name"
},
"globalID": "Buyer identifier",
"globalIDScheme": "0190",
"email": "Buyer electronic address"
},
"deliveryAddress": {
  "name": "Deliver to party name",
  "zip": "98765",
  "street": "Deliver to address line 1",
  "location": "Deliver to city",
  "country": "IE",
  "additionalAddress": "Deliver to address line 2",
  "additionalAddressExtension": "Deliver to address line 3",
  "globalID": "deliver location identifier",
  "globalIDScheme": "0045"
},
"payee": {
  "name": "Payee name",
  "legalOrganisation": {},
  "globalID": "Payee identifier",
  "globalIDScheme": "0098"
},
"sellerOrderReferencedDocumentID": "def",
"totalPrepaidAmount": 0,
"invoiceReferencedDocumentID": "abc123",
"despatchAdviceReferencedDocumentID": "lmn",
"creditorReferenceID": "Bank assigned creditor identifier",
"roundingAmount": 0,
"paymentReference": "Remittance information",
"lineTotalAmount": 200,
"duePayable": 205,
"grandTotal": 205,
"taxBasis": 200,
"valid": true,
"additionalReferencedDocuments": [
  {
    "filename": "filename0",
    "mimetype": "application/pdf",
    "relation": "Data",
    "description": "Additional file attachment",
  }
]

```

```

    "data": "ZGVmYXVsdA=="
  }
],
"ownTaxID": "DE49294093",
"ownVATID": "DE12345677",
"notesWithSubjectCode": [
  {
    "content": "invoice note text"
  },
  {
    "content": "invoice note text 2"
  }
],
"detailedDeliveryPeriodFrom": "2018-11-11T23:00:00.000+00:00",
"detailedDeliveryPeriodTo": "2018-11-29T23:00:00.000+00:00",
"zfallowances": [
  {
    "totalAmount": 10,
    "basisAmount": 100,
    "taxPercent": 5,
    "reason": "Doc allowance reason text",
    "reasonCode": "95",
    "categoryCode": "S"
  }
],
"zfcharges": [
  {
    "totalAmount": 10,
    "basisAmount": 100,
    "taxPercent": 5,
    "reason": "Doc charge reason text",
    "reasonCode": "AAA",
    "categoryCode": "S"
  }
],
"zfitems": [
  {
    "price": 10,
    "quantity": 10,
    "basisQuantity": 1,
    "detailedDeliveryPeriodFrom": "2018-11-11T23:00:00.000+00:00",
    "detailedDeliveryPeriodTo": "2018-11-29T23:00:00.000+00:00",
    "id": "1a",
    "buyerOrderReferencedDocumentLineID": "12345",
    "product": {
      "unit": "EA",
      "name": "Item name",
      "sellerAssignedID": "Item seller's identifier",
      "buyerAssignedID": "Item buyer's identifier",
      "description": "Item description",
      "taxCategoryCode": "S",
    }
  }
]

```

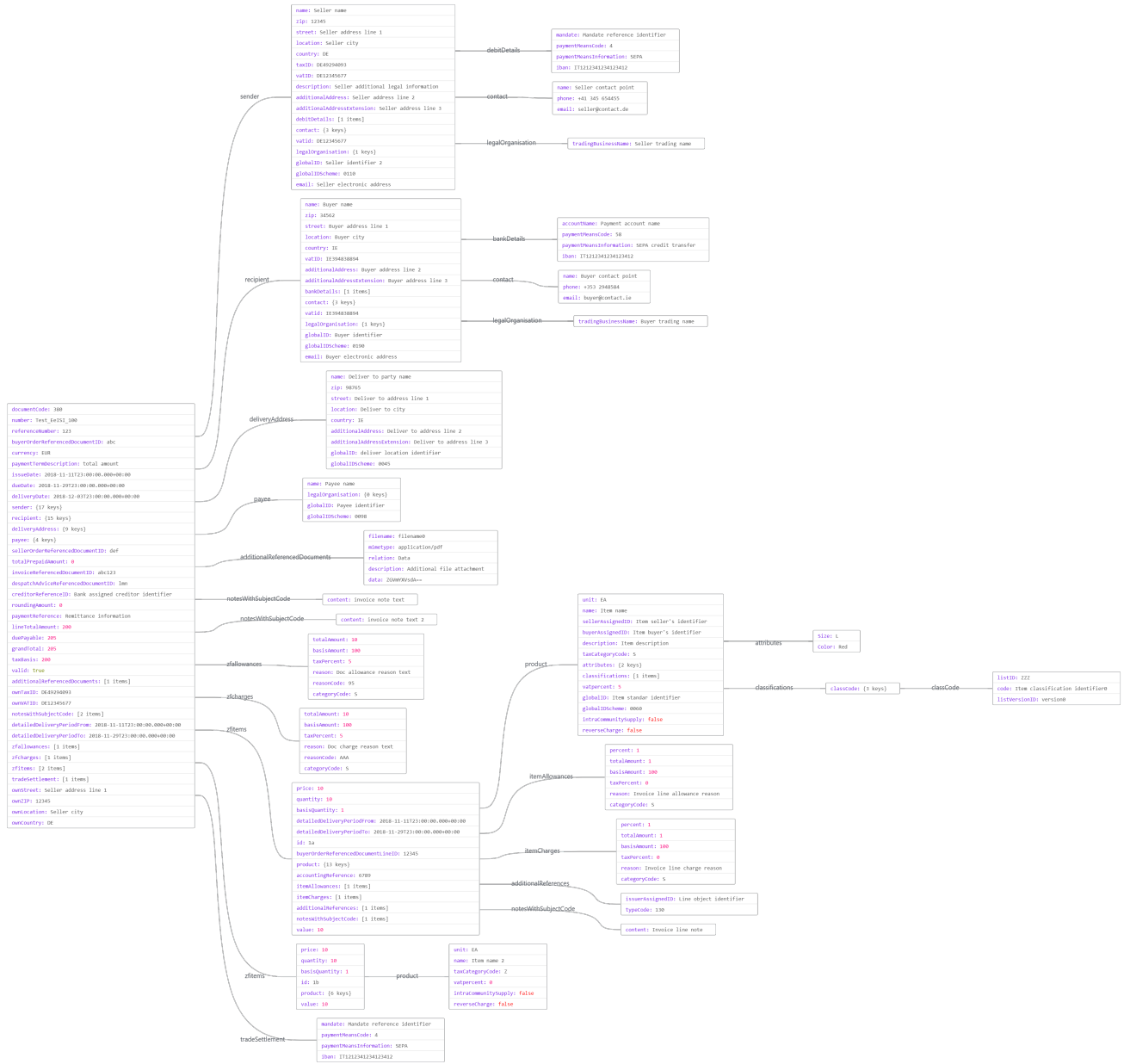
```

"attributes": {
  "Size": "L",
  "Color": "Red"
},
"classifications": [
  {
    "classCode": {
      "listID": "ZZZ",
      "code": "Item classification identifier0",
      "listVersionID": "version0"
    }
  }
],
"vatpercent": 5,
"globalID": "Item standar identifier\n          ",
"globalIDScheme": "0060",
"intraCommunitySupply": false,
"reverseCharge": false
},
"accountingReference": "6789",
"itemAllowances": [
  {
    "percent": 1,
    "totalAmount": 1,
    "basisAmount": 100,
    "taxPercent": 0,
    "reason": "Invoice line allowance reason",
    "categoryCode": "S"
  }
],
"itemCharges": [
  {
    "percent": 1,
    "totalAmount": 1,
    "basisAmount": 100,
    "taxPercent": 0,
    "reason": "Invoice line charge reason",
    "categoryCode": "S"
  }
],
"additionalReferences": [
  {
    "issuerAssignedID": "Line object identifier",
    "typeCode": "130"
  }
],
"notesWithSubjectCode": [
  {
    "content": "Invoice line note"
  }
],

```

```
    "value": 10
  },
  {
    "price": 10,
    "quantity": 10,
    "basisQuantity": 1,
    "id": "1b",
    "product": {
      "unit": "EA",
      "name": "Item name 2",
      "taxCategoryCode": "Z",
      "vatpercent": 0,
      "intraCommunitySupply": false,
      "reverseCharge": false
    },
    "value": 10
  }
],
"tradeSettlement": [
  {
    "mandate": "Mandate reference identifier",
    "paymentMeansCode": "4",
    "paymentMeansInformation": "SEPA",
    "iban": "IT1212341234123412"
  }
],
"ownStreet": "Seller address line 1",
"ownZIP": "12345",
"ownLocation": "Seller city",
"ownCountry": "DE"
}
```

*JSONCrack visualization of the JSON of a comprehensive invoice*



### 8.1.2. BT-IDs

The following BTs are mapped as follows:

JSONPath	BT ID
recipient	
recipient.name	BT-44
recipient.id	BT-46
recipient.vatID ( also mentioned as recipient.vatID)	BT-48
recipient.street	BT-50
recipient.additionalAddress	BT-51
recipient.additionalAddressExtension	BT-163



<b>JSONPath</b>	<b>BT ID</b>
recipient.location	BT-52
recipient.zip	BT-53
recipient.country	BT-55
recipient.globalID	ID BT-46
recipient.globalIDScheme	ID Scheme BT-46
recipient.contact.name	BT-56
recipient.contact.phone	BT-57
recipient.contact.email	BT-58
recipient.legalOrganisation.tradingBusinessName	BT-45
sender	
sender.name	BT-27
sender.legalOrganisation.tradingBusinessName	BT-28
sender.globalID	BT-29
sender.globalIDScheme	BT-29-ID
sender.vatid ( also mentioned as sender.vatID)	BT-31
sender.taxID	BT-32
sender.street	BT-35
sender.additionalAddress	BT-36
sender.additionalAddressExtension	BT-162
sender.zip	BT-38
sender.location	BT-37
sender.country	BT-40
sender.contact.name	BT-41
sender.contact.phone	BT-42
sender.contact.email	BT-43
Invoice	
number	BT-1
documentCode	BT-3
currency	BT-5
buyerOrderReferencedDocumentID	BT-13
sellerOrderReferencedDocumentID	BT-14

JSONPath	BT ID
despatchAdviceReferencedDocumentID	BT-16
referenceNumber	BT-10
Payment Details / Invoice Comment	
issueDate	BT-9
tradeSettlement.iban	BT-84
Price details – items	
zfitems.quantity	BT-129
zfitems.product.unit	BT-130
zfitems.price	BT-146
zfitems.product.taxCategoryCode	BT-151
zfitems.product.vatpercent	BT-152
zfitems.buyerOrderReferencedDocumentLineID	BT-132
zfitems.product.name	BT-153
zfitems.product.sellerAssignedID	BT-155
zfitems.product.globalID	BT-157
zfitems.product.globalIDScheme	BT-157-ID
zfitems.additionalReferences.issuerAssignedID	BT-128

### 8.1.3. Included Notes

Remarks on document level are passed in the Array notesWithSubjectCode, subjectCode is optional.

```
"notesWithSubjectCode": [
  [
    {
      "content": "MUSTER-Autovermietung GMBH\nMusterstr. 99\n99199
MUSTERHAUSEN\nGeschäftsführung:\nMaxima Musterfrau\nUSt-IdNr:
DE136695976\nTelefon: +49 711-50885524\nwww.musterlieferant.de\nHRB Nr.
372876\nAmtsgericht Musterstadt\nGLN 4304171000002",
      "subjectCode": "REG"
    },
    {
      "content": "Bei Rückfragen:\nTelefon: +49 711-50885524\nE-Mail :
info@muster-autovermietung.de"
    }
  ]
]
```

The meaning of the Subject codes is as follows

AAI	General information
SUR	Seller notes
REG	Regulatory information
ABL	Legal information
TXD	Tax information
CUS	Customs information
ACY	Introduction
AAK	Discount and bonus agreements
ABZ	Vehicle license number

#### 8.1.4. File attachments

File attachments are Base64-encoded in the attribute `additionalReferencedDocuments`. Example:

```
{
  "additionalReferencedDocuments": [
    {
      "data": "b25ldHdvdGhyZWU=",
      "description": "Additional file attachment",
      "filename": "text.txt",
      "mimetype": "text/plain",
      "relation": "Data"
    }
  ],
  "number": "471102",
  "currency": "EUR",
  "issueDate": "2018-03-04T00:00:00.000+01:00",
  "dueDate": "2018-03-04T00:00:00.000+01:00",
  "deliveryDate": "2018-03-04T00:00:00.000+01:00",
  "sender": {
    "name": "Lieferant GmbH",
    "zip": "80333",
    "street": "Lieferantenstraße 20",
    "location": "München",
    "country": "DE",
    "taxID": "201/113/40209",
    "vatID": "DE123456789",
    "globalID": "4000001123452",
    "globalIDScheme": "0088"
  },
  "recipient": {
    "name": "Kunden AG Mitte",
    "zip": "69876",
    "street": "Kundenstraße 15",
```

```

"location": "Frankfurt",
"country": "DE"
},
"zfitems": [
{
"price": 9.9,
"quantity": 20,
"product": {
"unit": "H87",
"name": "Trennblätter A4",
"description": "",
"vatpercent": 19,
"taxCategoryCode": "S"
}
},
{
"price": 5.5,
"quantity": 50,
"product": {
"unit": "H87",
"name": "Joghurt Banane",
"description": "",
"vatpercent": 7,
"taxCategoryCode": "S"
}
}
]
}

```

### 8.1.5. Corrected Invoices, Credit Notes

For credit notes use TypeCode=DocumentCode389. All other (except invoices 380) should refer to the according invoice using `buyerOrderReferencedDocumentID`: Invoice related credit notes use documentCode 381, for Corrected invoices have documentCode 384 and the quantity of the items to be corrected, which should no longer be billed to the customer, should be negative, resulting in a negative grand total.

### 8.1.6. Small businesses

Example for small business

```

{
"number": "471102",
"currency": "EUR",
"issueDate": "2018-03-04T00:00:00.000+01:00",
"dueDate": "2018-03-04T00:00:00.000+01:00",
"deliveryDate": "2018-03-04T00:00:00.000+01:00",
"sender": {
"name": "Lieferant GmbH",

```

```

"zip": "80333",
"street": "Lieferantenstraße 20",
"description": "Kleinunternehmer nach §119 UStG",
"location": "München",
"country": "DE",
"taxID": "201/113/40209",
"vatID": "DE123456789",
"globalID": "4000001123452",
"globalIDScheme": "0088"
},
"recipient": {
"name": "Kunden AG Mitte",
"zip": "69876",
"street": "Kundenstraße 15",
"location": "Frankfurt",
"country": "DE"
},
"zfitems": [
{
"price": 9.9,
"quantity": 20,
"product": {
"unit": "H87",
"name": "Trennblätter A4",
"description": "",
"vatpercent": 0,
"taxExemptionReason": "Small business, §119 UStG",
"taxCategoryCode": "E"
}
}
]
}

```

### 8.1.7. Example for intra community supply

```

{
"number": "471102",
"currency": "EUR",
"issueDate": "2018-03-04T00:00:00.000+01:00",
"dueDate": "2018-03-04T00:00:00.000+01:00",
"deliveryDate": "2018-03-04T00:00:00.000+01:00",
"sender": {
"name": "Lieferant GmbH",
"zip": "80333",
"street": "Lieferantenstraße 20",
"location": "München",
"country": "DE",
"taxID": "201/113/40209",
"vatID": "DE123456789",

```

```

"globalID": "4000001123452",
"globalIDScheme": "0088"
},
"recipient": {
"name": "Kunden AG Mitte",
"zip": "69876",
"street": "Kundenstraße 15",
"location": "Frankfurt",
"country": "DE"
},
"zfitems": [
{
"price": 9.9,
"quantity": 20,
"product": {
"unit": "H87",
"name": "Trennblätter A4",
"description": "",
"vatpercent": 0,
"taxExemptionReason": "intra-community supply",
"taxCategoryCode": "K"
}
}
]
}

```

### 8.1.8. Cash discounts

For cash discounts add an array (because there can be multiple rates, at multiple intervals) with days and percent to the invoice:

```

"cashDiscounts": [
{
"days": 14,
"percent": 2
}
]

```

### 8.1.9. Leitweg-ID

The german B2G ID can be set in the invoice root level as

```

"referenceNumber": "04011000-12345-34"

```

### 8.1.10. Item allowances/charges

In the item in zfitems there may be arrays itemAllowances or itemCharges. E.g. 10 cent allowance

would be

```
{
  "basisQuantity": 1,
  "itemAllowances": [
    {
      "categoryCode": "S",
      "totalAmount": 0.1
    }
  ],
  "price": 3.0,
  ...
},
```

and 50% charges are

```
{
  "basisQuantity": 1,
  "itemCharges": [
    {
      "categoryCode": "S",
      "percent": 50,
      "taxPercent": 0
    }
  ]
}
```

Please note that this will only be interpreted when writing since XML parsing already adjusts the net price to already contain all allowances/charges.

## 8.2. CalculatedInvoice

E.g. [https://www.mustangproject.org/files/MustangGnuaccountingBeispielRE-20201121\\_508.pdf](https://www.mustangproject.org/files/MustangGnuaccountingBeispielRE-20201121_508.pdf) parses as

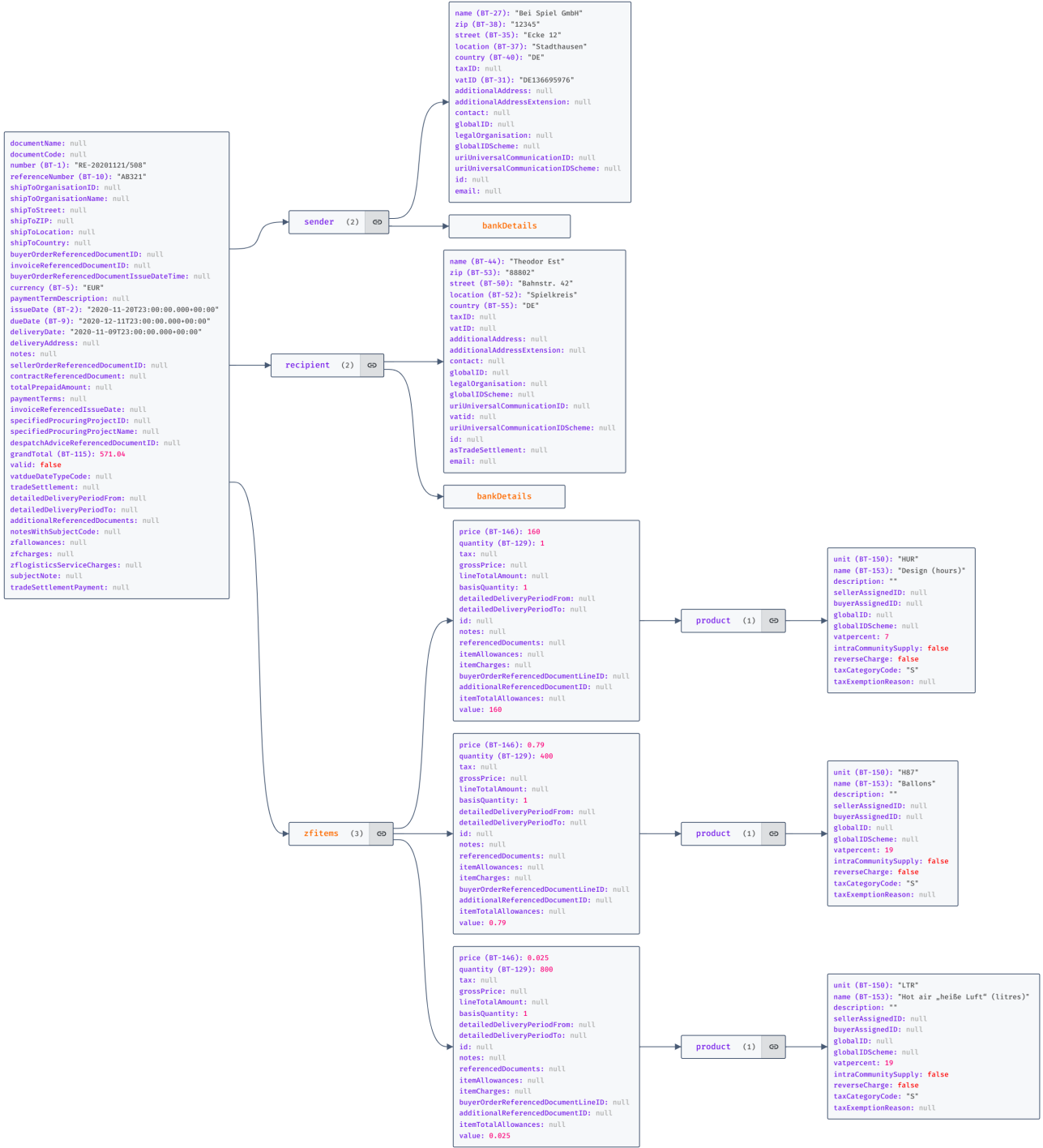
```
{ "documentName": null, "documentCode": "380", "number":
"RE-20201121/508", "ownOrganisationFullPlaintextInfo": null,
"referenceNumber": "AB321", "shipToOrganisationID": null,
"shipToOrganisationName": null, "shipToStreet": null, "shipToZIP": null,
"shipToLocation": null, "shipToCountry": null,
"buyerOrderReferencedDocumentID": null, "invoiceReferencedDocumentID":
null, "buyerOrderReferencedDocumentIssueDateTime": null,
"ownForeignOrganisationID": null, "ownOrganisationName": "Bei Spiel
GmbH", "currency": "EUR", "paymentTermDescription": null, "issueDate":
"2020-11-20T23:00:00.000+00:00", "dueDate":
"2020-12-11T23:00:00.000+00:00", "deliveryDate":
"2020-11-09T23:00:00.000+00:00", "sender": { "name": "Bei Spiel GmbH",
"zip": "12345", "street": "Ecke 12", "location": "Stadthausen",
```

```

"country": "DE", "taxID": null, "vatID": "DE136695976",
"additionalAddress": null, "additionalAddressExtension": null,
"bankDetails": [ { "accountName": null, "bic": null, "iban":
"DE8820080000970375700" } ], "contact": null, "legalOrganisation":
null, "uriUniversalCommunicationID": null,
"uriUniversalCommunicationIDScheme": null, "globalID": null,
"globalIDScheme": null, "vatic": "DE136695976", "id": null, "email":
null, "asTradeSettlement": [ { "accountName": null, "bic": null,
"iban": "DE8820080000970375700" } ] }, "recipient": { "name": "Theodor
Est", "zip": "88802", "street": "Bahnstr. 42", "location": "Spielkreis",
"country": "DE", "taxID": null, "vatID": null, "additionalAddress":
null, "additionalAddressExtension": null, "bankDetails": [], "contact":
null, "legalOrganisation": null, "uriUniversalCommunicationID": null,
"uriUniversalCommunicationIDScheme": null, "globalID": null,
"globalIDScheme": null, "vatic": null, "id": "2", "email": null,
"asTradeSettlement": null }, "deliveryAddress": null, "cashDiscounts":
[], "notes": null, "sellerOrderReferencedDocumentID": null,
"contractReferencedDocument": null, "totalPrepaidAmount": null,
"paymentTerms": null, "invoiceReferencedIssueDate": null,
"specifiedProcuringProjectID": null, "specifiedProcuringProjectName":
null, "despatchAdviceReferencedDocumentID": null, "creditorReferenceID":
null, "grandTotal": 571.04, "valid": false, "ownStreet": "Ecke 12",
"ownZIP": "12345", "zfallowances": null, "zfitems": [ { "price": 160,
"quantity": 1, "tax": null, "grossPrice": null, "lineTotalAmount": null,
"basisQuantity": 1, "detailedDeliveryPeriodFrom": null,
"detailedDeliveryPeriodTo": null, "id": null, "product": { "unit":
"HUR", "name": "Design (hours)", "sellerAssignedID": null,
"buyerAssignedID": null, "description": "", "countryOfOrigin": null,
"attributes": null, "intraCommunitySupply": false, "vatpercent": 7,
"globalID": null, "globalIDScheme": null, "reverseCharge": false,
"taxCategoryCode": "S", "taxExemptionReason": null }, "notes": null,
"referencedDocuments": null, "additionalReferences": null,
"buyerOrderReferencedDocumentLineID": null, "itemAllowances": null,
"itemCharges": null, "itemTotalAllowances": null,
"additionalReferencedDocumentID": null, "value": 160 }, { "price":
0.79, "quantity": 400, "tax": null, "grossPrice": null,
"lineTotalAmount": null, "basisQuantity": 1,
"detailedDeliveryPeriodFrom": null, "detailedDeliveryPeriodTo": null,
"id": null, "product": { "unit": "H87", "name": "Ballons",
"sellerAssignedID": null, "buyerAssignedID": null, "description": "",
"countryOfOrigin": null, "attributes": null, "intraCommunitySupply":
false, "vatpercent": 19, "globalID": null, "globalIDScheme": null,
"reverseCharge": false, "taxCategoryCode": "S", "taxExemptionReason":
null }, "notes": null, "referencedDocuments": null,
"additionalReferences": null, "buyerOrderReferencedDocumentLineID":
null, "itemAllowances": null, "itemCharges": null,
"itemTotalAllowances": null, "additionalReferencedDocumentID": null,
"value": 0.79 }, { "price": 0.025, "quantity": 800, "tax": null,
"grossPrice": null, "lineTotalAmount": null, "basisQuantity": 1,
"detailedDeliveryPeriodFrom": null, "detailedDeliveryPeriodTo": null,
"id": null, "product": { "unit": "LTR", "name": "Hot air [heiÙe Luft]

```

```
(litres)", "sellerAssignedID": null, "buyerAssignedID": null,
"description": "", "countryOfOrigin": null, "attributes": null,
"intraCommunitySupply": false, "vatpercent": 19, "globalID": null,
"globalIDScheme": null, "reverseCharge": false, "taxCategoryCode": "S",
"taxExemptionReason": null }, "notes": null, "referencedDocuments":
null, "additionalReferences": null,
"buyerOrderReferencedDocumentLineID": null, "itemAllowances": null,
"itemCharges": null, "itemTotalAllowances": null,
"additionalReferencedDocumentID": null, "value": 0.025 } ], "ownTaxID":
null, "tradeSettlement": [ { "accountName": null, "bic": null, "iban":
"DE8820080000970375700" } ], "ownVATID": "DE136695976", "ownLocation":
"Stadthausen", "ownCountry": "DE", "zfcharges": null,
"detailedDeliveryPeriodTo": null, "notesWithSubjectCode": null,
"detailedDeliveryPeriodFrom": null, "vatdueDateTypeCode": null,
"zflogisticsServiceCharges": null, "additionalReferencedDocuments":
null, "subjectNote": null, "tradeSettlementPayment": null }
```



# Chapter 9. Operations/Endpoints

## 9.1. /mustang

Mustangserver's available operations are

### 9.1.1. mustang-controller

#### ping

Just a quick healthcheck, always just returns „pong“. The only operation accessible via HTTP GET, the rest is POST.

#### xmltopdf

Converts a UBL or CII XML file (parameter file) into a human readable PDF/A-3 in german language. The PDF will not have file attachments, i.e. you still have to combineXML if you want to get a Factur-X/ZUGFeRD file from a XML.

#### xmltohtml

converts a UBL or CII XML file (parameter file) into a human readable HTML in the language specified in language, which can be EN, DE or FR. The resulting file will require the additional files in the same directory:

- [xrechnung-viewer.css](#) and
- [xrechnung-viewer.js](#)

#### styledinvoicetofx

Converts a [calculated invoice](#) object and a HTML template to Factur-X. StyledInvoice is a JSON structure around a invoice rather than a class with login in itself.

#### Templates

The [mustache](#) (i.e. double-curly-bracket-embraced) placeholders (`{{number}}`, `{{currency}}`) in the HTML follow the Mustang JSON structure, ZFItems is an array and within a `{{#ZFItems}}...{{/ZFItems}}` block you have access to item elements like this

```

{{#ZFItems}}
<tr>
  <td>{{quantity}} </td>
  <td>{{#UNIT}}{{product.unit}}{{/UNIT}}</td>
  <td>{{product.name}} {{product.description}}</td>
  <td>{{product.VATPercent}}%</td>
  <td>{{price}} €</td>
  <td>{{calculation.itemTotalNetAmount}} €</td>
</tr>

```

```
{{/ZFItems}}
```

Not all HTML and CSS features may be supported, SVG is. There is a [sandbox](#) where HTML can be made working and a [guide](#) on some peculiarities.

### Predefined HTML-Templates

Some Styled Invoice templates which you can just adapt to your needs include:

*Comprehensive: using this [JSON](#)*

# ZWICK ELEKTROTECHNIK GmbH

R-2024-12345

www.zwick-elektro.de

Handwerkerstrasse 8, 78054 Villingen-Schwenningen

+49 7721 555123 | rechnung@zwick-elektro.de

<b>RECHNUNG AN</b> <b>Musterindustrie AG</b> Fabrikstr. 12-14, 70569 Stuttgart	<b>DETAILS</b> Rechnungsdatum: <b>14.02.2024</b> Leistungszeitraum: <b>01.-14.02.2024</b>
--	---

<b>ZAHLUNGSZIEL</b> <b>30 Tage</b>	<b>SKONTO</b> <b>2%</b>	<b>KUNDENNR</b> <b>K-23456</b>	<b>BESTELLUNG</b> <b>B-2024-04567</b>
---------------------------------------	----------------------------	-----------------------------------	--

Leistungen					
#	Beschreibung	Menge	Einzel	MwSt	Gesamt
1	Elektroinstallation	8 Std	65,00 EUR	19%	520,00 EUR
2	Materialkosten	1 Kompl.	345,80 EUR	19%	345,80 EUR
3	Notfallservice	4 Std	95,00 EUR	19%	380,00 EUR
4	Sicherheitspruefung	1 Pruef.	450,00 EUR	19%	450,00 EUR

MWST. BERECHNUNG		RECHNUNGSSUMME	
Netto (19%)	<b>1.695,80 EUR</b>	Nettosumme	<b>1.695,80 EUR</b>
MwSt. (19%)	<b>322,20 EUR</b>	+ MwSt.	<b>322,20 EUR</b>
MwSt. gesamt	<b>322,20 EUR</b>	- Skonto (2%)	<b>-33,92 EUR</b>
		<b>BRUTTO</b>	<b>1.984,08 EUR</b>

**Zahlung:** Volksbank Schwarzwald | IBAN: DE99 3704 0044 0532 0130 00**Verwendungszweck:** R-2024-12345

Zahlbar innerhalb 30 Tagen (2% Skonto bei Zahlung innerhalb 10 Tagen).

ZWICK ELEKTROTECHNIK GmbH - Handwerkerstrasse 8 - 78054 Villingen-Schwenningen

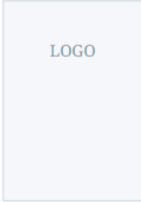
Geschaeftsfuehrer: Max Zwick

Handelsregister: Amtsgericht Freiburg - HRB 123456

USt-IdNr.: DE123456789 - Steuernr.: 22123/45678

Clear: using this [JSON](#)

Tel: | E-Mail:  
 USt-IdNr.: | Steuernr.:



**Verkäufer**

**Rechnung an**

Tel:  
 E-Mail:  
 USt-IdNr.:

Tel:  
 E-Mail:  
 USt-IdNr.:

Rechnungsnummer	Rechnungsdatum	Leistungsdatum
Kundennummer	Zahlungsziel Tage	Zahlungsart

**Rechnungspositionen**

Pos.	Beschreibung	Menge	Einzelpreis	MwSt.	Gesamt
1	Webdesign Dienstleistung - Corporate Website	10 Stunden	85,00 €	19%	850,00 €
2	Domain-Hosting (Jahresgebühr)	1 Jahr	59,90 €	19%	59,90 €
3	SSL-Zertifikat - Extended Validation	1 Stück	49,00 €	19%	49,00 €
4	Wartung und Support (monatlich)	3 Monate	75,00 €	19%	225,00 €
5	Beratungsgespräch (2 Stunden)	2 Stunden	120,00 €	19%	240,00 €

**MwSt. Aufschlüsselung**

**Rechnungssumme**

Netto Summe (19% MwSt.):	€	Netto Gesamt:	€
MwSt. (19%):	€	MwSt. Gesamt:	€
Netto Summe (7% MwSt.):	€	<b>Brutto Gesamt:</b>	<b>€</b>
MwSt. (7%):	€		
<b>Summe MwSt.:</b>	<b>€</b>		

**Zahlungsinformationen**

**Bankverbindung:**  
 IBAN: | BIC:  
 Verwendungszweck: -

**Gesetzliche Aufbewahrungspflicht:** Diese Rechnung ist gemäß § 14 Umsatzsteuergesetz (UStG) und § 257 Handelsgesetzbuch (HGB) für die Dauer von 10 Jahren aufzubewahren.

Vielen Dank für Ihren Auftrag! Bei Fragen zu dieser Rechnung kontaktieren Sie uns bitte unter oder .



*Modern: using this [JSON](#)*

# Musterfirma GmbH

Musterstrasse 123  
10115 Berlin  
Tel: 030 12345678 | E-Mail: info@musterfirma.de  
USt-IdNr.: DE123456789 | Steuernr.: 123/456/78901

LOGO

## Verkäufer

**Max Mustermann**  
Verkäuferstrasse 45  
80331 München  
Tel: 089 98765432  
E-Mail: verkauf@musterfirma.de  
USt-IdNr.: DE987654321

## Rechnung an

**Beispiel Kunde AG**  
Kundenweg 78  
20095 Hamburg  
Tel: 040 1234567  
E-Mail: einkauf@beispielkunde.de  
USt-IdNr.: DE456789123

Rechnungsnummer <b>2024-00123</b>	Rechnungsdatum <b>14.02.2024</b>	Leistungsdatum <b>01.01.2024 - 31.01.2024</b>
Kundennummer <b>K-12345</b>	Zahlungsziel <b>30 Tage</b>	Zahlungsart <b>Ueberweisung</b>

## Rechnungspositionen

Pos.	Beschreibung	Menge	Einzelpreis	MwSt.	Gesamt
1	Webdesign Dienstleistung - Corporate Website	10 Stunden	85,00 €	19%	850,00 €
2	Domain-Hosting (Jahresgebühr)	1 Jahr	59,90 €	19%	59,90 €
3	SSL-Zertifikat - Extended Validation	1 Stück	49,00 €	19%	49,00 €
4	Wartung und Support (monatlich)	3 Monate	75,00 €	19%	225,00 €
5	Beratungsgespräch (2 Stunden)	2 Stunden	120,00 €	19%	240,00 €

## MwSt. Aufschlüsselung

Netto Summe (19% MwSt.):	1.423,90 €
MwSt. (19%):	270,54 €
Netto Summe (7% MwSt.):	0,00 €
MwSt. (7%):	0,00 €
<b>Summe MwSt.:</b>	<b>270,54 €</b>

## Rechnungssumme

Netto Gesamt:	1.423,90 €
MwSt. Gesamt:	270,54 €
<b>Brutto Gesamt:</b>	<b>1.694,44 €</b>

## Zahlungsinformationen

**Bankverbindung:** Musterbank AG  
**IBAN:** DE89 3704 0044 0532 0130 00 | **BIC:** COBADEFFXXX  
**Verwendungszweck:** 2024-00123 - Beispiel Kunde AG

**Gesetzliche Aufbewahrungspflicht:** Diese Rechnung ist gemäß § 14 Umsatzsteuergesetz (UStG) und § 257 Handelsgesetzbuch (HGB) für die Dauer von 10 Jahren aufzubewahren.

Vielen Dank für Ihren Auftrag! Bei Fragen zu dieser Rechnung kontaktieren Sie uns bitte unter info@musterfirma.de oder 030 12345678.

**Minimal example**

```
{
  "mustache": "<html><body>Hello world</body></html>"
}
```

Will just create a PDF/A file without Factur-X, for which you would have to provide an invoice key. Useful only if you e.g. want to reuse your letterhead.

```
{
  "mustache": "<html><body>Hello customer {{recipient.name}}</body></html>",
  "invoice": {
    "number": "471102", "currency": "EUR", "issueDate": "2018-03-04T00:00:00.000+01:00",
    "dueDate": "2018-03-04T00:00:00.000+01:00", "deliveryDate": "2018-03-04T00:00:00.000+01:00",
    "sender": {
      "name": "Lieferant GmbH", "zip": "80333", "street": "Lieferantenstraße 20",
      "location": "München", "country": "DE", "taxID": "201/113/40209", "vatID": "DE123456789",
      "globalID": "4000001123452", "globalIDScheme": "0088"},
    "recipient": {
      "name": "Kunden AG Mitte", "zip": "69876", "street": "Kundenstraße 15",
      "location": "Frankfurt", "country": "DE"},
    "zfitems": [
      {
        "price": 9.9, "quantity": 20, "product": {
          "unit": "H87", "name": "Trennblätter A4", "description": "", "vatpercent": 19,
          "taxCategoryCode": "S"} } ]
  }
}
```

Will work but of course a productive invoice should show all XML data also in the PDF. The Mustache template names reflect the JSON structure.

Default is Factur-X in EN16931 profile, this may become customizable in the future.

**Resources**

In the template you may use http, https and data for URLs, additionally you can use the [s3](#) or [base64](#) -"protocol". The base64-"protocol" allows you to specify name+base 64 encoded value pairs. This is similar to [data-urls](#) but it allows to reuse your "file" multiple times.

To encode a binary file you can use online tools like <https://www.base64encode.org/> or offline tools like <https://www.gunamoi.com.au/soft/base64convert/index.html>

this has to be in one line and e.g. no tabs are allowed test in <https://jsonformatter.curiousconcept.com/#> jsonlint or jsoncrack

**NOTE** the HTML/Mustache template has to be passed as a JSON string, i.e. is quoted, single line, without tabs (`\n` or `\t` may be used) while the invoice object is another JSON

structure and may therefore be spread over multiple lines.

Similarly, to access `s3`-objects, you have to specify the referred name vis á vis the object name.

S3-objects can be stored on your own, or rented, S3 space, or temporarily uploaded to your quota.

#### NOTE

Instead of Mustache, you could also use only HTML. But even if you don't use Mustache placeholders please still make sure your invoice object is correct and complete as it will be embedded as XML into your PDF.

#### Resource example

```
{
  "mustache": "<html><head>  <style>          body {          font-family:\\"Sans\\";
margin: 0 auto;          font-size:12px;          padding:1rem;          }
</style></head><body>Hello <img src='base64:excl.svg'/> image</body></html>",
  "invoice": {
    "number": "471102",
    "currency": "EUR",
    "issueDate": "2018-03-04T00:00:00.000+01:00",
    "dueDate": "2018-03-04T00:00:00.000+01:00",
    "deliveryDate": "2018-03-04T00:00:00.000+01:00",
    "sender": {
      "name": "Lieferant GmbH",
      "zip": "80333",
      "street": "Lieferantenstraße 20",
      "location": "München",
      "country": "DE",
      "taxID": "201/113/40209",
      "vatID": "DE123456789",
      "globalID": "4000001123452",
      "globalIDScheme": "0088"
    },
    "recipient": {
      "name": "Kunden AG Mitte",
      "zip": "69876",
      "street": "Kundenstraße 15",
      "location": "Frankfurt",
      "country": "DE"
    },
    "zfitems": [
      {
        "price": 9.9,
        "quantity": 20,
        "product": {
          "unit": "H87",
          "name": "Trennblätter A4",
          "description": "",
          "vatpercent": 19,
          "taxCategoryCode": "S"
        }
      }
    ]
  }
}
```

```

}
},
{
"price": 5.5,
"quantity": 50,
"product": {
"unit": "H87",
"name": "Joghurt Banane",
"description": "",
"vatpercent": 7,
"taxCategoryCode": "S"
}
}
]
},
"base64":{"excl.svg":"PHN2ZyB4bWxucz0iaHR0cDovL3d3dy53My5vcmcvMjAwMC9zdmciIHZpZXdCb3g9
IjAgMCA2NDAgNjQwIj48IS0tIUZvbnQgQXdlc29tZSBGcmVlIHY3LjEuM0CBieSBAZm9udGF3ZXNvbWUgLSBodH
Rwc2ovL2ZvbnRhd2Vzb211LmNvbSBMaWN1bnNlIC0gaHR0cHM6Ly9mb250YXdlc29tZS5jb20vbG1jZW5zZS9m
cmVlIEIENvcHlyaWdodCAyMDI1IEZvbnRyY29ucyw5SW5jLi0tPjxwYXR0IGQ9Ik0zMjAgNjRDMz00LjcgNjQgMz
Q4LjIjIjIuMSAzNTUuMiA4NUw1NzEuMiA0ODVDNTc3LjkgNDk3LjQgNTc3LjYgNTEyLjQgNTcwLjQgNTI0LjVD
NTYzLjIjIjIuNTUuLjEgNTQ0IDUzNiA1NDRMMTA0IDU0NEM4OS45IDU0NCA3Ni44IDUzNi42IDY5LjYgNT
I0LjVDNjIuNCA1MTIuNCA2Mi4xIDQ5Ny40IDY4LjggNDg1TDI4NC44IDg1QzI5MS44IDcyLjEgMzA1LjMgNjQg
MzIwIDY0ek0zMjAgNDE2QzMwMi4zIDQxNiAyODggNDMwLjMgMjg4IDQ0OEMyODggNDY1LjcgMzAyLjMgNDgwID
MyMCA0ODBDMzMLjcgNDgwIDM1MiA0NjUuNyAzNTI4NDQ4QzM1MiA0MzAuMyAzMzcuNyA0MTYgMzIwIDQxNnpN
MzIwIDIyNEMzMDEuOCAYMjQgMjg3LjMgMjM5LjUgMjg4LjYgMjU3LjdmMjk2IDM2MS43QzI5Ni45IDM3NC4yID
MwNy40IDM4NCAzMTkuOSAzODRDMzMyLjUgMzggIDM0Mi45IDM3NC4zIDM0My44IDM2MS43TDM1MS4yIDI1Ny43
QzM1Mi41IDIzOS41IDMzOC4xIDIyNCAzMTkuOCAYMjR6Ii8+PC9zdmci+"}
}

```

**NOTE**

You will not have access to system default fonts (except "Serif" and "Sans"), fonts like "Arial", "Helvetica", "Verdana" or "Times New Roman" will not work unless a TTF file is specified. Incorrect fonts will not render the according paragraph. In your CSS, you may have to specify (TTF) fonts to be used via https, http, s3 or base64.

There is [information](#) on how fonts can be embedded and [free and open source fonts](#) available.

**Functions/"Lambdas"**

The following functions ("Lambdas") can be used. A `{{#<NAME>}}` indicates their beginning and a `{/<NAME>}}` their end, like this:

- CURRENCYFORMAT: e.g. `{{#CURRENCYFORMAT}}21.9000231{/CURRENCYFORMAT}}` or `{{#CURRENCYFORMAT}}{{calculated}}{/CURRENCYFORMAT}}` rounds to two digits (21.90)
- DATEFORMAT local-specific date, e.g. 21.12.2025 and
- UNIT returns a human readable version of unit codes for most commonly used codes, e.g. H87=piece

**NOTE**

The specified language effects e.g. unit codes.

Additional to the structure of `calculatedinvoice`, a currency field `VATtotal` is available.

### Sophisticated example

This is a rather sophisticated example using CSS including `VATtotal`, page count and lambdas for date, currency and unit format:

```
<html>
  <head>
    <style>

      body {
        font-family:"Sans";
        margin: 0 auto;
        font-size:12px;
        padding:1rem;
      }

      .seller-subscript, .grey{
        color: grey;
        font-size:8px;
        margin-left: 2rem;
      }

      .grey{
        color:grey;
        font-size:x-small;
      }

      .invoice-date, .page-no{
        color: grey;
      }

      .img-logo{
        float:right;
        width:3cm;
      }

      .buyer-details{
        height:20rem;
        line-height:2.5;
        margin-top: 5rem;
      }

      .seller-details{
        color: #a5a5a5;
        font-size: x-small;
        margin:0;
        line-height: 1.5;
        float: right;
      }

      .footer{
        float:right;
        color: #a5a5a5;
        font-size: x-small;
```

```

        bottom:0;
        margin:4rem 0;
        width:12rem;
    }
    .center_div {
        border: 1px solid gray;
        margin-left: auto;
        margin-right: auto;
        width: 90%;
        text-align: left;
        padding: 8px;
    }
    table, th, td {
        border: 1px solid black;
        border-collapse: collapse;
        vertical-align:top;
    }
    .number{
        margin:0;
    }
    .power{
        font-size: small;
    }

    @page {
        @bottom-center {
            font-family:"Sans";
            color: #a5a5a5;
            font-size: x-small;
            content:'Seite' counter(page) '/' counter(pages);
        }
    }

</style>
</head>
<body>
<small class = "invoice-date"> {{#DATEFORMAT}} {{issueDate}} {{/DATEFORMAT}} </small>
    <div class = "inner-div">

        <p class="seller-details">
            <br>
            <b>usegroup</b><br>
            <b>Inh. Jochen Stärk</b><br>
            Königsteiner 27<br>

```

```

        60481 Frankfurt<br><br>
        fon(069) 59 66 40-18<br>
        <br>
        info@usegroup.de<br>
        www.usegroup.de<br>
    </p>

    <p class = "buyer-details">
    <small class = "seller-subscript">Jochen Stärk   Königsteiner 27   □
60481 Frankfurt</small><br>
        {{recipient.name}}</br>
        {{recipient.street}}</br>
        {{recipient.zip}} {{recipient.location}}</br>
    </p>

<p class ="number"> Ihre Nummer: {{number}}
    <br><br>
    Rechnung # {{number}} vom {{#DATEFORMAT}}{{issueDate}}{}/DATEFORMAT}}</p>

<table style="width:100%;height:10%;">
<tr>
    <td>Anz. </td>
    <td>Einh. </td>
    <td style="width:50%;">Produkt</td>
    <td>USt</td>
    <td>Einzelpreis</td>
    <td>Summe</td>
</tr>
{{#ZFItems}}

<tr>
<td>{{quantity}} </td>
<td>{{#UNIT}}{product.unit}}{}/UNIT}}</td>
<td>{{product.name}} {{product.description}}</td>
<td>{{product.VATPercent}}%</td>
<td>{{#CURRENCYFORMAT}}{price}}{}/CURRENCYFORMAT}} €</td>
<td>{{calculation.itemTotalNetAmount}} €</td>

{{/ZFItems}}

</tr>

</table>

Summe netto: {{calculation.value}} €<br>
Zuzügl. USt:<br>
<table style="width:50%;height:5%;">

```

```

<tr class="grey">
  <td >USt-Satz.</td>
  <td>Nettobetrag</td>
  <td>USt-Betrag</td>
</tr>

{{#calculation.taxDetails}}

  <tr class="grey">
    <td>{{applicablePercent}}%</td>
    <td>{{basis}} € </td><td>
{{#CURRENCYFORMAT}}&#128;{{calculated}}&#128;{{/CURRENCYFORMAT}} €</td>
  </tr>
  <tr>
    &#128;{{/calculation.taxDetails}}
  <tr>
    <td colspan="2">Gesamt USt: </td>
    <td>{{VATtotal}} €</td>
  </tr>
</table>
<br>
<b> Bitte überweisen Sie bis zum
{{#DATEFORMAT}}&#128;{{dueDate}}&#128;{{/DATEFORMAT}}: </b>
<br>
Summe inkl. USt: {{calculation.duePayable}} €

<p class = "power"> <b> Powered by MustangAccounting</b></p>

<p class = "footer">
USt-ID: DE199922957<br>
IBAN DE54 5004 0000 0702 7119 00 <br>
BIC COBADEFFXXX <br>
Commerzbank Frankfurt<br>
Kontoinhaber: Jochen Stärk
</p>
  &#128;</div>
</body>
</html>

```

Once you remove the linebreaks and tabs put an according logo\_final\_RGB.svg in the base64 block you will receive the following result

04.03.2018

Jochen Stärk # Königssteiner 27 # 60481 Frankfurt

Kunden AG Mitte  
 Kundenstraße 15  
 69876 Frankfurt



usegroup  
 Inh. Jochen Stärk  
 Königssteiner 27  
 60481 Frankfurt

fon(069) 59 66 40-18

info@usegroup.de  
 www.usegroup.de

Ihre Nummer: 471102

Rechnung # 471102 vom 04.03.2018

Anz.	Einh.	Produkt	USt	Einzelpreis	Summe
20	Stück	Trennblätter A4	19%	9.90 €	198.00 €
50	Stück	Joghurt Banane	7%	5.50 €	275.00 €

Summe netto: 473.00 €

Zuzügl. USt:

USt-Satz.	Nettobetrag	USt-Betrag
19%	198.00 €	37.62 €
7%	275.00 €	19.25 €
<b>Gesamt USt:</b>		<b>56.87 €</b>

**Bitte überweisen Sie bis zum 04.03.2018:**

Summe inkl. USt: 529.87 €

**Powered by MustangAccounting**

USt-ID: DE199912957  
 IBAN DE54 5004 0000 0701 7317 00  
 BIC COBADEFFXXX  
 Commerzbank Frankfurt  
 Kontoinhaber: Jochen Stärk

## Visual designers

If you want your users to be able to design, there are a couple of embeddable open source WYSIWYG HTML editors which should work fine with Mustache templates, i.e.

- [CKEditor](#)
- [tinymce](#)
- [Aloha HTML5](#)
- [QuillJS](#)
- [Summernote](#)
- React-based [Puck](#)
- [Prosemirror](#) +it's vue js port [tiptap.dev](#) as well as the editors of
- [Vistaprint](#)
- [Xing](#)
- or [Medium](#)

## S3 return

If the (optional) header parameter `writeS3` is set to `true` the result will not be an octet stream but a JSON structure like

```
{
  "outputKey": "a9d38052-a2ee-4aab-8e78-3d364c5f6876"
}
```

which indicates the filename (key) of the resulting factur-x file which has been written to S3.

## pdf2pdfa

pdf2pdfa is a quicker but unfortunately less thorough way to convert ordinary PDF files to archivable and invoice-ready PDF/A.

To give you an impression this are the PDF/A validation results of [The Archivist's PDF Cabinet of Horrors](#) of this endpoint compared with the commercial Ghostscript option:

pdfCabinetOfHorrors	pdf2pdfa	Ghostscript
balloon_a1b_jp2k.pdf	Unknown	valid
calistoMTNoFontsEmbedded.pdf	valid	valid
corruptionOneByteMissing.pdf	valid	valid
digitally_signed_3D_Portfolio.pdf	invalid	invalid
embedded_video_avi.pdf	invalid	valid
embedded_video_quicktime.pdf	invalid	valid

<b>pdfCabinetOfHorrors</b>	<b>pdf2pdfa</b>	<b>Ghostscript</b>
encryption_nocopy.pdf	invalid	valid
encryption_noprinting.pdf	invalid	valid
encryption_notextaccess.pdf	invalid	valid
encryption_openpassword.pdf	Unknown	valid
externalLink.pdf	invalid	invalid
fileAttachment.pdf	invalid	invalid
fileAttachment_fileAttachmentAnnotation.pdf	valid	invalid
javascript.pdf	invalid	valid
pdf-17-header18.pdf	invalid	valid
test_fontArialNotEmbedded.pdf	invalid	valid
text_only_fontsEmbeddedAll.pdf	invalid	valid
text_only_fontsEmbeddedSubset.pdf	invalid	valid
text_only_fontsNotEmbedded.pdf	invalid	valid
text_only_pdfa1b.pdf	valid	valid
veraPDFHiRes.pdf	valid	valid
veraPDFHiResChangedHeight.pdf	valid	valid
veraPDFHiResWrongObjectID.pdf	Unknown	valid
webCapture.pdf	invalid	invalid

Please validate the results using a PDF/A validator, e.g. [Verapdf](#)

Contrary to the ghostscript endpoint this method is not yet S3 capable.

## parse

Read a Factur-X/ZUGFeRD/XRechnung and create a JSON representation.  
Requires a Factur-X , Order-X or Xrechnung-file.

Will return a `calculatedInvoice`, i.e. a `grandTotal` will be available. If it is set when writing (`invoice2XML` and `combineInvoice`), it will be compared vis á vis the calculated items and an exception will be thrown if the values do not match. In particular when writing a Factur-X PDF this should be used to ensure the machine readable XML-values match the human readable PDF values.

The object will look as described for [CalculatedInvoice example](#).

parse is the reverse operation to „invoice2XML“, i.e. if you have access to a XML sample you want to reproduce, running it through parse will give you JSON which should create a very similar XML if passed through invoice2XML.

### invoice2xml

Converts a Factur-X/ZUGFeRD/XRechnung JSON representation to XML. Requires a input JSON string, a format (ZUGFeRD = zf, XRechnung = xr, Factur-X = fx or Order-X=ox), a version (usually 2 for ZUGFeRD and 1 for Factur-X) and a profile ("MINIMUM","BASICWL","BASIC","EN16931","EXTENDED" or "XRECHNUNG"

for Factur-X, for ZUGFeRD 1 "BASIC","COMFORT" or "EXTENDED"). For XRechnung only "XRECHNUNG".

Please refer to the documentation of the [Invoice class](#).

invoice2XML is the reverse operation to „parse“, i.e. if you have access to a XML sample you want to reproduce, running it through parse will give you JSON which should create

a very similar XML if passed through invoice2XML.

### extract

Extracts just the XML (not as JSON like parse) from a Factur-X/ZUGFeRD/Order-X file.

### detach

Parameter: file

Extracts all file attachments from the PDF (including e.g. a factur-x.xml) and the XML, if the invoice has attachments, and returns a JSON structure with base64-encoded contents like this:

```
{
  "pdf": [],
  "xml":
  [{"fileA.png": "iVBORw0KGgoAAAANSUHEUgAAAaAAAC1CAQAAADIUnarAAAABGdBTUEAALGPC/xhBQAAAC
  BjSfJNAAB6JgAAgIQAAPoAAACA6AAAdTAAAOpgAAA6mAAAF3CcuLE8AAAAAmJLR0QA/4ePzL8AAAAJcEhZcwAA
  CxMAAAsTAQCanBgAAAAHdE1NRQfkAQIXGQ0qsHJfAAAAo0LEQVRIx+3MoQrCUBjF8f+9dzBtgha72eAYLJgMQ4
  tvMREfQuw+wGA2mxarxTeYgi9gEwyDNa0fYTrM5u+kw4/DcQAwI4PO+Q5gK2AsUVW+UEdBQUFBQUFBQUFB4W9I
  QhMRL3oABpKppLaLmEIm2cXMR6897c++cEM3WBPUBw2eVrzfR/Gtd6Cs4SFH11/DFn18oDTLb0cgPwWFacpNVp
  stvAG3bSYVfhBdGAAAACV0RVh0ZGF0ZTpjcmVhdGUAMjAyMjU6MTM5MDA6MDAyILuQAAAAAE1FTkSuQmCC"}, {"same
  fileB.png": "iVBORw0KGgoAAAANSUHEUgAAAaAAAC1CAQAAADIUnarAAAABGdBTUEAALGPC/xhBQAAACBjSf
  JNAAB6JgAAgIQAAPoAAACA6AAAdTAAAOpgAAA6mAAAF3CcuLE8AAAAAmJLR0QA/4ePzL8AAAAJcEhZcwAACxMA
  AAsTAQCanBgAAAAHdE1NRQfkAQIXGQ0qsHJfAAAAo0LEQVRIx+3MoQrCUBjF8f+9dzBtgha72eAYLJgMQ4tvMR
  EfQuw+wGA2mxarxTeYgi9gEwyDNa0fYTrM5u+kw4/DcQAwI4PO+Q5gK2AsUVW+UEdBQUFBQUFBQUFB4W9IQhMR
  L3oABpKppLaLmEIm2cXMR6897c++cEM3WBPUBw2eVrzfR/Gtd6Cs4SFH11/DFn18oDTLb0cgPwWFacpNVpstvA
  G3bSYVfhBdGAAAACV0RVh0ZGF0ZTpjcmVhdGUAMjAyMjU6MTM5MDA6MDAyILuQAAAAAE1FTkSuQmCC"}]}
}
```

The input file can be a PDF/A-3, or a XML. Please note a PDF/A-3 may have both pdf and xml attachments at the same time (embedded within the xml which is embedded in the PDF).

### **combine**

Combines a JSON encoded invoice object (as described for „[parse](#)“) and a PDF/A document to a Factur-X/ZUGFeRD PDF/A-3 document. Requires a input PDF/A-1 or A-3 file, a format (ZUGFeRD = zf, Factur-X = fx or Order-X = ox), a version (usually 2 for ZUGFeRD and 1 for Factur-X) and a profile ("MINIMUM","BASICWL","BASIC","EN16931","EXTENDED" or "XRECHNUNG" for Factur-X, for ZUGFeRD 1 "BASIC","COMFORT" or "EXTENDED").

If returnJSON (optional) is true (default false) the return value will be a JSON whose key „pdf“ is base64 encoded. If ignorePDFAEerrors (optional) is true (default false) the PDFbox pre-validation will raise no exceptions if the input PDF/A file is invalid.

The attribute grandTotal will be calculated by multiplying item quantities with their prices, adding the lines, adding charges and removing allowances, and adding the calculated VAT amounts.

Sample for writing, e.g. Invoice2XML: Please refer to the documentation of the [Invoice class](#).

### **combineXML**

Combines CII XML and a PDF/A document to a Factur-X/ZUGFeRD PDF/A-3 document. Requires a input PDF/A-1 or A-3 file, a format (ZUGFeRD = zf, Factur-X = fx or Order-X = ox), a version (usually 2 for ZUGFeRD and 1 for Factur-X) and a profile ("MINIMUM","BASICWL","BASIC","EN16931","EXTENDED" or "XRECHNUNG" for Factur-X, for ZUGFeRD 1 "BASIC","COMFORT" or "EXTENDED").

If returnJSON (optional) is true (default false) the return value will be a JSON whose key „pdf“ is base64 encoded. If ignorePDFAEerrors (optional) is true (default false) the PDFbox pre-validation will raise no exceptions if the input PDF/A file is invalid.

### **cii2ubl**

transforms XML from the UN/CEFACT Cross Industry Invoice (CII) XML format, the basis of factur-x/ZUGFeRD and the CII version of the XRechnung, to the Universal Business Language format, UBL. Requires a CII string.

### **calculate**

The calculate endpoint takes an [invoice](#) and returns a [calculatedInvoice](#), i.e. it performs all multiplications, additions, roundings etc. With this invoice you can e.g. preview final amounts or taxes via ajax when allowing users to build their invoices in a web form.

## **9.1.2. validation-controller**

### **validationReportToPDF**

Will convert a XML result from /validate, passed as String validationResult, to a archivable, human readable, german PDF file.

Screenshot of a part of a PDF validation report of an invalid file

## Prüfbericht

### Angaben zur Prüfanwendung

Name: mustangproject.org  
Version: 2.24.0

### Angaben zum geprüften Dokument

Referenz: tovalidatea3d2b596-cd98-4035-af0e-c74ea1140c9d12826582047807201338mustangserver  
Zeitpunkt der Prüfung: 2026-06-22 19:40:21  
Erkannter Dokumenttyp: urn:cen.eu:en16931:2017

**ZUGFeRD-PDF: Das ZUGFeRD-PDF ist nicht valide.**

**E-Rechnung XML: Das XML ist nicht valide.**

**Bewertung: Es wird empfohlen, das Dokument zurückzuweisen.**

Validierungsergebnisse im Detail:

Type	Code	Schwere	Text
4		Warnung	[PEPPOL-EN16931-R008]-Document MUST not contain empty elements. (still status warning) from /xslt/ZF_250/FACTUR-X_EN16931.xslt)
Pfad: /*:CrossIndustryInvoice[namespace-uri()='urn:un:unece:uncefact:data:standard:CrossIndustryInvoice:100'][1] /*:SupplyChainTradeTransaction[namespace-uri()='urn:un:unece:uncefact:data:standard:CrossIndustryInvoice:100'][1] /*:ApplicableHeaderTradeDelivery[namespace-uri()='urn:un:unece:uncefact:data:standard:ReusableAggregateBusinessInformationEntity:100'][1]			

### validate

Validate a Factur-X/ZUGFeRD, XRechnung CII or UBL or Order-X/-CIO File using Mustang's validator. Requires a file and returns a Mustang XML report. The format to be validated against will be read from it's guideline ID.

(optional parameter: ignoreNotices, boolean, default false)

Warnings and errors will always be contained in the XML result, if ignoreNotices is set to true no notices will be present. Currently notices mention additional validation results, i.e. if you pass a EN16931 Factur-X file there may be notices which additional elements may be required to also get a valid XRechnung.

### phive

Validate a international and/or Peppol e-invoice file using [Phive](#). Requires a file and returns a Phive JSON report. Specification of a format/version combination (VES ID) to validate against is optional but the list of the 310 available format/standard/version-combinations are listed [online](#).

## 9.2. Upload-Download-API (/s3)

S3 is incrementally introduced for file management. They can e.g. used in StyledInvoiceToFX. Very similar functions are available in Mustang-Docs, in which they are already required.

This means typically you would initiate a REST request, then periodically REST poll for it to complete, then REST the result.

REST file management services and status inquiries are not accounted for in your monthly operational volume.

Your result will be stored at least 24h and each customer has at least 1GB of storage for uploads and results. You can, however, procure or provide your own S3 storage space, in which case no such limits will apply.

### 9.2.1. upload

By uploading a Multipart File to upload, it will be placed on the bucket.

#### Parameters

- file : a multipart file

#### Return

JSON-Structure with the key of the uploaded file, and the key of the downloaded file to be generated, e.g.

```
{"outputKey": "27a72345-d3dd-47c5-917e-55ec852a6000"}
```

### 9.2.2. download/{key}

After a status is done the output key can be downloaded using /mustang/download/{key} Please use libraries, [Bruno](#) or similar if the download exceeds 10MB as some browser may cancel their connection if more data is returned.

### 9.2.3. delete/{key}

After download, feel free to /mustang/delete/{key} the file. Unless you use a customized S3 bucket all files will be cleaned up, i.e. deleted, after 24h anyway and total space quota per customer is 1GB.

### 9.2.4. list

using /mustang/list you can receive a list of keys (i.e. files) for your tenant in your bucket, e.g.

```
{
  "result": [
    "27a72345-d3dd-47c5-917e-55ec852a6000",
    "3ddf0de1-e7db-4909-acbc-1180ac7e6850"
  ]
}
```

This list does not distinguish between source or result files.

## 9.2.5. ping

Just a health check, will return the string `pong`

## 9.2.6. General information on S3 connectivity

### Configure

You can provide your own bucket by logging in on <https://mustangserver.com/settings/> with your API credentials.

### Naming conventions

Mustangserver uses `<Tenantname>/<guid>` as keys for the objects. Tenantname is usually your Mustangserver username.

In case you use a standalone version the Tenantname will match the username header for your requests. In the public offering this username header is overwritten by the API management with the username of the API key or oauth token.

You can use graphical UIs like the open source software Cyberdock to manage the files in your S3 installation.

### Procure

You can book S3 space at any provider (for as little as 60ct/GB/10yr). If the provider is not AWS, you will just have to put the endpoint in the URL field.

### Provide

You can also arrange access to your own (onsite) S3 server, e.g. using the open source MinIO server. Open firewall ports 9000 and 9001. In case of virtualization (e.g. Proxmox) make sure the necessary CPU features are available, e.g. by using `cpu type "host"`.

```
sudo apt install podman
podman run -e MINIO_ROOT_PASSWORD='<root pwd>' -e MINIO_ROOT_USER='admin' -p
9000:9000 -p 9001:9001 quay.io/minio/minio server /data --console-address ":9001" -d
```

enter web ui and create bucket, e.g. abucket

```
curl https://dl.min.io/client/mc/release/linux-amd64/mc --create-dirs -o
$HOME/minio-binaries/mc
chmod +x $HOME/minio-binaries/mc
export PATH=$PATH:$HOME/minio-binaries/
```

You can then add a user

```
./minio-binaries/mc alias set local http://<servername>:9000 admin '<password>'
```

```
./minio-binaries/mc admin user add local <clientid> <secret>
```

and grant this user read/write privileges on the bucket

```
./minio-binaries/mc admin policy attach local readwrite --user <clientid>
./minio-binaries/mc admin user info local <clientid>
```

Afterwards the configuration via [mustangserver.com/settings/](https://mustangserver.com/settings/) is straightforward.

Please only note that despite a "region" field is not needed by MinIO, it is required by the library used so feel free to put an arbitrary value.

```
bucket: abucket
region: arbitrary (it may just not be blank)
url http://<servername>:9000/
client id:
client secret:
```

## 9.3. EEisi (/eeisi), free tier

### 9.3.1. eigor

Converts a UBL to a CII, FatturaPA, or vice versa

Parameters:

- sourceFormat: „ubl“, „cii“ or „fatturapa“
- destFormat: „ubl“, „cii“ or „fatturapa“
- xml: the XML in the source format to be converted

## 9.4. PDF to PDF/A (/mustang-docs)

Mustang-Docs is used to convert ordinary PDF documents to PDF/A, which may be required for electronic invoicing, e.g. as a basis for Factur-X/ZUGFeRD.

Since Version 2, Mustang-Docs is a pipelined process.

If you want to access our AMPQ-pipeline directly, please send us a mail. Otherwise, AMQP processes are initiated by a HTTP REST request, their status can be inquired likewise, and accompanying files can be managed with HTTP REST endpoints to upload, list, delete and download files, or, when using customized S3 connectivity, by managing the files on their network share directly.

This means typically you would initiate a REST request, then periodically REST poll for it to complete, then REST the result.

REST file management services and status inquiries are not accounted for in your monthly

operational volume.

Your result will be stored at least 24h and each customer has at least 1GB of storage for uploads and results. You can, however, procure or provide your own S3 storage space, in which case no such limits will apply.

*Screenshot of the documents endpoints*

The screenshot displays the Postman interface for the PDF/A Converter API. At the top, there's a 'Servers' dropdown menu showing the URL 'https://gw.usegroup.de:8243/mustang-doc/2.0.0'. Below this, the API is organized into sections: 'PDF/A Converter API', 'health-controller', and 'version-controller'. Each section contains a list of endpoints with their respective HTTP methods and descriptions. The endpoints are:
 

- POST /mustang/upload**: Upload a file
- POST /mustang/submitPdf**: Submit a PDF file and convert it to a Pdf/A-1
- GET /mustang/status/{key}**: Request the status of a process by its output key. The status can be 'RECEIVED', 'PROCESSING', 'COMPLETED', or 'FAILED'.
- GET /mustang/list**: Get an overview of all files in the output directory
- GET /mustang/download/{key}**: Download the converted PDF/A file by its filename. Web browsers may abort the request after 10MB.
- GET /mustang/delete/{key}**: Deletes a file.
- GET /mustang/ping**: Healthcheck. Just request a ping, will respond with a 'pong'
- GET /mustang/notice**: Returns legal related information

 Each endpoint entry includes a dropdown arrow and a lock icon.

### 9.4.1. submitPDF

By uploading a Multipart File to submitPDF, specifying the desired PDF/A target version, you can initiate a conversion from PDF to PDF/A.

#### Parameters

- file : a multipart file
- version
  - 1: simplest form
  - 2: supports among others better image compression
  - 3: supports file attachments, vital for Factor-X
  - 4: not yet available

#### Return

JSON-Structure with the key of the uploaded file, and the key of the downloaded file to be generated, e.g.

```
{"inputKey": "3ddf0de1-e7db-4909-acbc-1180ac7e6850" , "outputKey": "27a72345-d3dd-47c5-
```

```
917e-55ec852a6000"}
```

### 9.4.2. status

The output key from submitPDF can be used as key parameter in `/mustang/status/{key}`, the result will be an array of output keys and their status. A status is available for 24h and can be RECEIVED, i.e. waiting, IN\_PROGRESS, DONE or FAILED.

Example return

```
{"27a72345-d3dd-47c5-917e-55ec852a6000":{"status":"DONE"}}
```

### 9.4.3. download/{key}

After a status is done the output key can be downloaded using `/mustang/download/{key}` Please use libraries, [Bruno](#) or similar if the download exceeds 10MB as some browser may cancel their connection if more data is returned.

### 9.4.4. delete/{key}

After download, feel free to `/mustang/delete/{key}` the file. Unless you use a customized S3 bucket all files will be cleaned up, i.e. deleted, after 24h anyway and total space quota per customer is 1GB.

### 9.4.5. list

using `/mustang/list` you can receive a list of keys (i.e. files) for your tenant in your bucket, e.g.

```
{
  "result": [
    "27a72345-d3dd-47c5-917e-55ec852a6000",
    "3ddf0de1-e7db-4909-acbc-1180ac7e6850"
  ]
}
```

This list does not distinguish between source or result files.

### 9.4.6. ping

Just a health check, will return the string `pong`

### 9.4.7. General information on S3 connectivity

#### Configure

You can provide your own bucket by logging in on <https://mustangserver.com/settings/> with your API credentials.

## Naming conventions

Mustangserver uses <Tenantname>/<guid> as keys for the objects. Tenantname is usually your Mustangserver username.

In case you use a standalone version the Tenantname will match the username header for your requests. In the public offering this username header is overwritten by the API management with the username of the API key or oauth token.

You can use graphical UIs like the open source software Cyberdock to manage the files in your S3 installation.

## Procure

You can book S3 space at any provider (for as little as 60ct/GB/10yr). If the provider is not AWS, you will just have to put the endpoint in the URL field.

## Provide

You can also arrange access to your own (onsite) S3 server, e.g. using the open source MinIO server. Open firewall ports 9000 and 9001. In case of virtualization (e.g. Proxmox) make sure the necessary CPU features are available, e.g. by using cpu type "host".

```
sudo apt install podman
podman run -e MINIO_ROOT_PASSWORD='<root pwd>' -e MINIO_ROOT_USER='admin' -p
9000:9000 -p 9001:9001 quay.io/minio/minio server /data --console-address ":9001" -d
```

enter web ui and create bucket, e.g. abucket

```
curl https://dl.min.io/client/mc/release/linux-amd64/mc --create-dirs -o
$HOME/minio-binaries/mc
chmod +x $HOME/minio-binaries/mc
export PATH=$PATH:$HOME/minio-binaries/
```

You can then add a user

```
./minio-binaries/mc alias set local http://<servername>:9000 admin '<password>'
./minio-binaries/mc admin user add local <clientid> <secret>
```

and grant this user read/write privileges on the bucket

```
./minio-binaries/mc admin policy attach local readwrite --user <clientid>
./minio-binaries/mc admin user info local <clientid>
```

Afterwards the configuration via [mustangserver.com/settings/](https://mustangserver.com/settings/) is straightforward.

Please only note that despite a "region" field is not needed by MinIO, it is required by the library used so feel free to put an arbitrary value.

```
bucket: abucket
region: arbitrary (it may just not be blank)
url http://<servername>:9000/
client id:
client secret:
```

## 9.5. Valitool (/valitool), extra subscription

/valitool has a ping endpoint

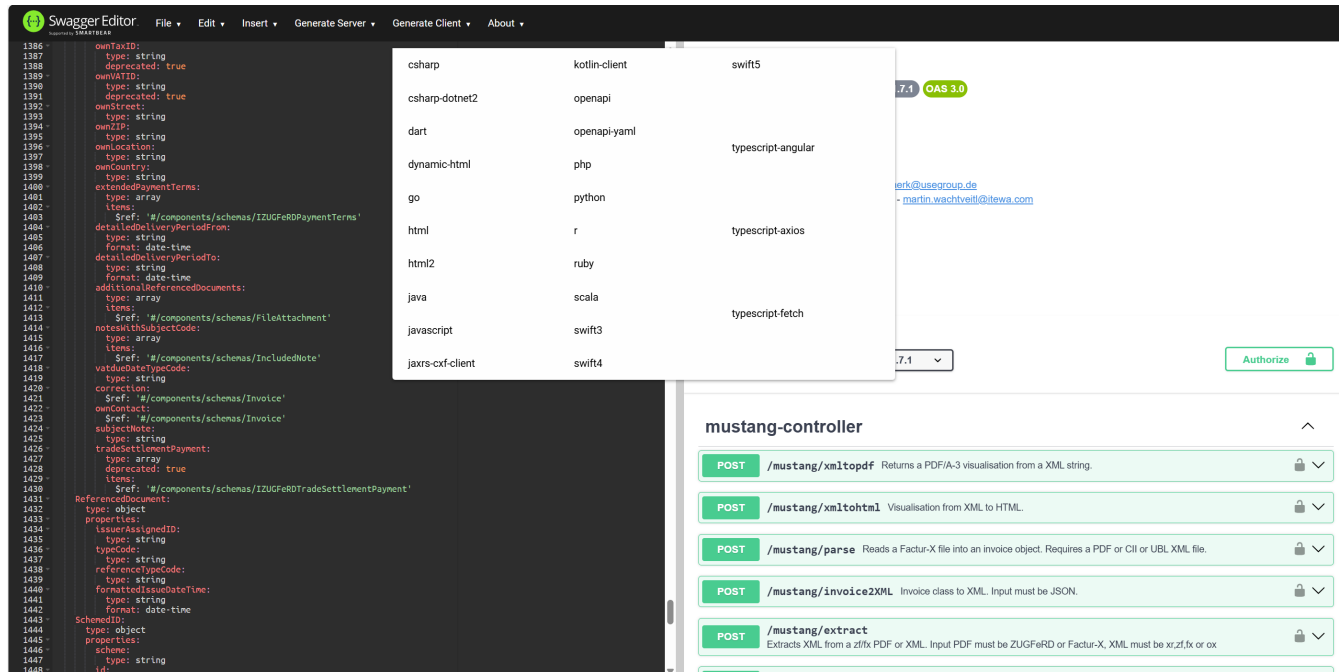
### 9.5.1. hybriddoc

Requires a XML or Factur-X file (parameter name „file“) and returns a XML valitool validation report

# Chapter 10. Clients

Apart from the [OpenAPI Generator](#) (which is e.g. used for our xref: [C#/ .net tutorial](#)), [Swagger editor](#) used to offer the generation of clients, but this functionality has now apparently been moved to it's [docker image](#).

*Screenshot of the docker version of editor.swagger.io*



All generated clients require testing and customization, e.g. as regards OAuth authentication, e.g. see our [PHP tutorial](#). We don't guarantee support for all of them, some of them are likely to not work at all, but these are the most important swagger-editor-docker generated Mustangserver clients:

- [dart-client-generated](#)
- [dynamic-html-client-generated](#)
- [go-client-generated](#)
- [html-client-generated](#)
- [html2-client-generated](#)
- [java-client-generated](#)
- [javascript-client-generated](#)
- [jaxrs-cxf-client-generated](#)
- [kotlin-client-generated](#)
- [php-client-generated](#)
- [python-client-generated](#)
- [r-client-generated](#)
- [ruby-client-generated](#)
- [typescript-axios-client-generated](#)

# Chapter 11. Tutorials

On our website we elaborated how precisely to e.g. create a

- [PHP](#) client, a
- [C#/.net](#) client or
- [Javascript](#) / Node.js / Node Red clients

# Chapter 12. Interactive testing using Postman/Bruno

**Bruno** is an open source alternative to Postman, graphical user interfaces to create/execute requests on REST APIs.

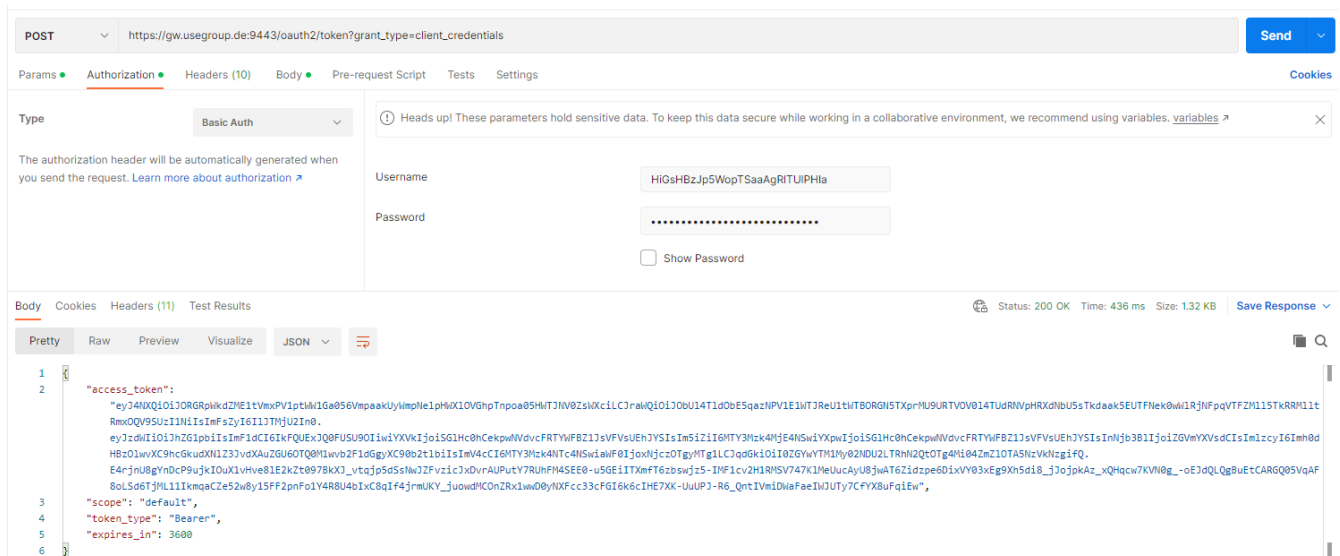
This example is based on **Postman**, you will need enabled client credentials as described in the **PHP tutorial**.

Use Import | File | Upload Files to upload you Openapi.yaml file into a Mustangserver collection.

Add a request to [https://gw.usegroup.de:9443/oauth2/token?grant\\_type=client\\_credentials](https://gw.usegroup.de:9443/oauth2/token?grant_type=client_credentials) and call it Token Request. Postman will auto-detect the Parameter in the URL. Change the type to POST.

In Headers, add a new field Content-Type with application/json as its value.

The tab Authorization should be Basic auth with your client id and secret as username and password. Once you click Send, an according access token should be submitted:



The screenshot shows the Postman interface with the following details:

- Method:** POST
- URL:** [https://gw.usegroup.de:9443/oauth2/token?grant\\_type=client\\_credentials](https://gw.usegroup.de:9443/oauth2/token?grant_type=client_credentials)
- Authorization:** Basic Auth
- Username:** HiGstHBzJp5WopT SaaAgRITUIPHla
- Password:** [Redacted]
- Status:** 200 OK
- Time:** 436 ms
- Size:** 1.32 KB
- Response Body (JSON):**

```

1  {
2    "access_token":
3      "eyJ2NDkxQ0IzOGRGRkdkZmE1tVmxPV1p1bWlGae05VmpaakUyYlmpPHe1pHkXIOVGhpTnpoa05HMtJlV0ZSs0Xc1LCrAwQ101J0BU14T1d0bE5qazNPV1E1WtJReU1tWtBORGN5TXprHU9URTV0V014TUdRnWpHRXGhbU5sTkdaak5EUTFNek0wI1RjNjFpVTFZM115TKRRM11tRmx0QV9SUzI1Ni1sImFsZy16I1I1THJlU2I0.",
4    "scope": "default",
5    "token_type": "Bearer",
6    "expires_in": 3600
7  }

```

```

var jsonData = JSON.parse(responseBody);

pm.collectionVariables.set("token", jsonData.access_token);

console.log(jsonData.access_token);

```

In the „Tests“ tab and View | Show Postman Console (Alt+CTRL+C) . Once you click Send again you should be able to see the access token also in the Console:





# Chapter 13. Performance Tests with Jmeter

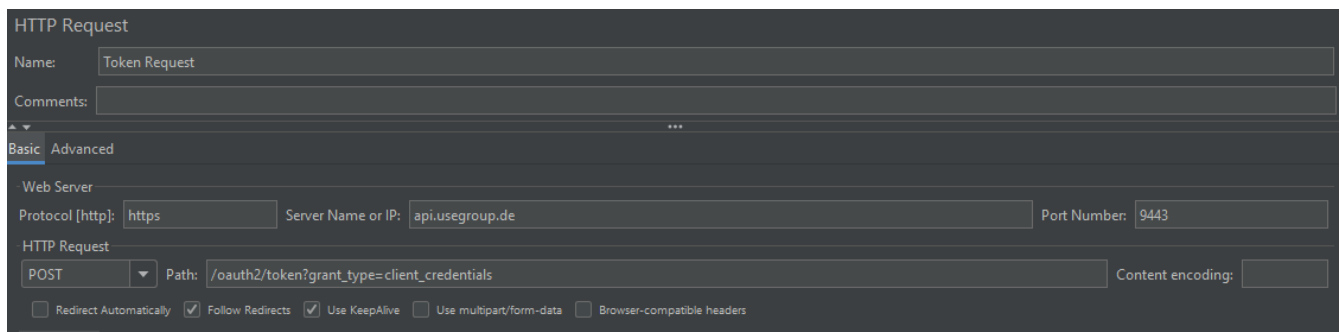
[Jmeter](#) is a generic load testing tool and load generator.

If you want to perform load tests, in order not to affect our production servers, we will happily grant you access to our mirror infrastructure, i.e. we will guarantee that the hardware, software and settings are identical.

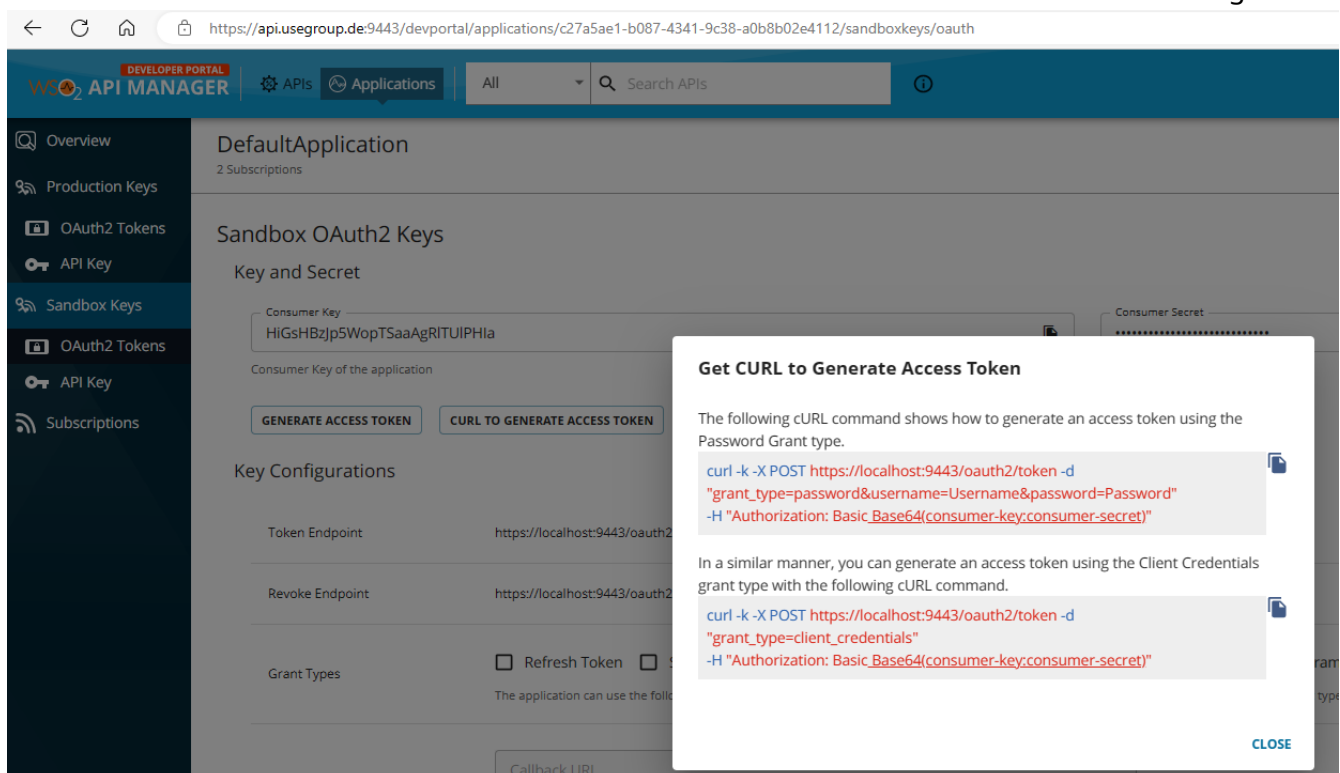
<https://openapi-generator.tech/> supports a Jmeter export but that does not handle authentication so here we describe how to set up some Jmeter performance test manually.

For this example, you will need enabled client credentials as described in the [PHP tutorial](#).

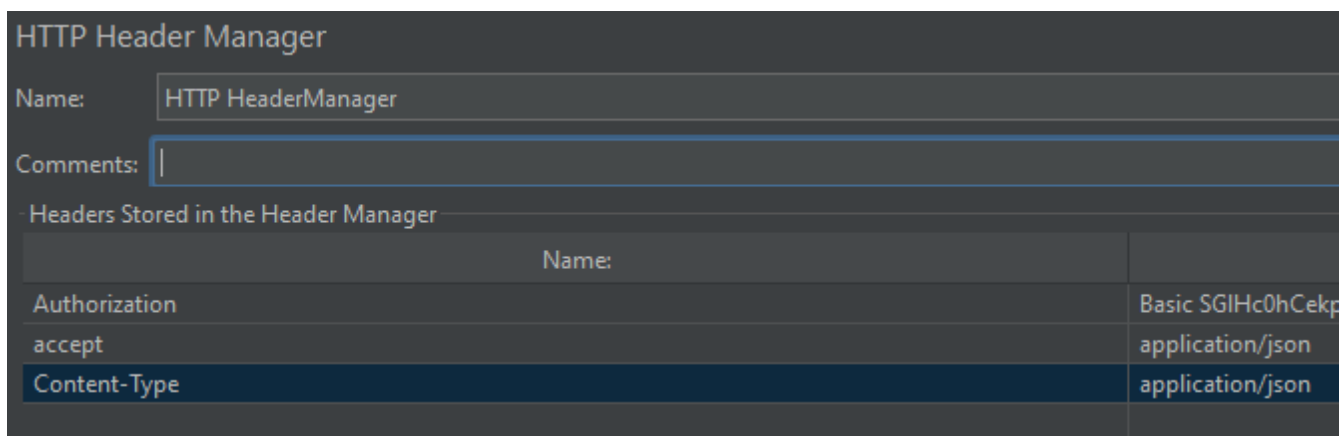
Right click your Test plan, add a Thread Group with a Once Only controller. Below that, add a HTTP request sampler, we'll call it Token Request. This is how it is defined: Change protocol to https, method to POST, add server name and port number, and add the path:



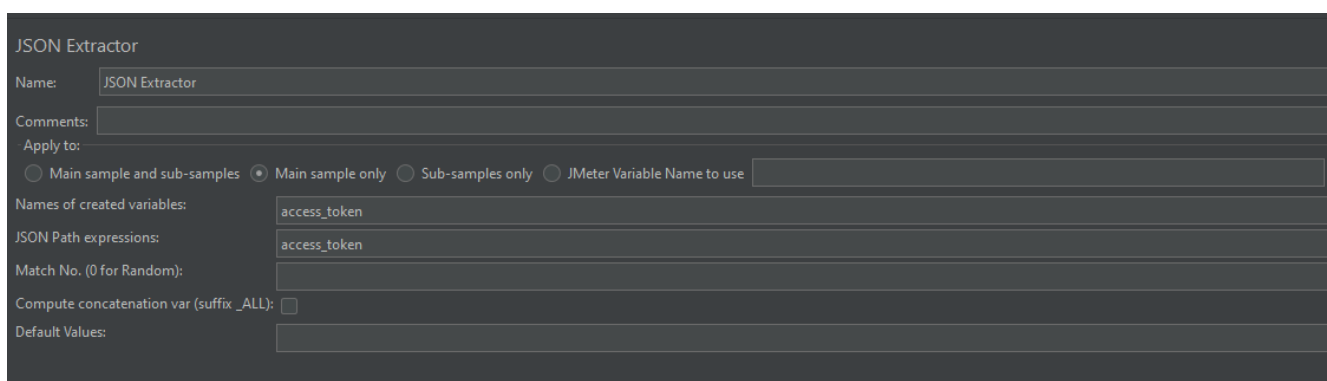
Base64encode your <consumer key>:<consumer secret> as described on the applications page of the API management:



In Jmeter, below the Token request, add a HeaderManager with Basic Authorization as described:



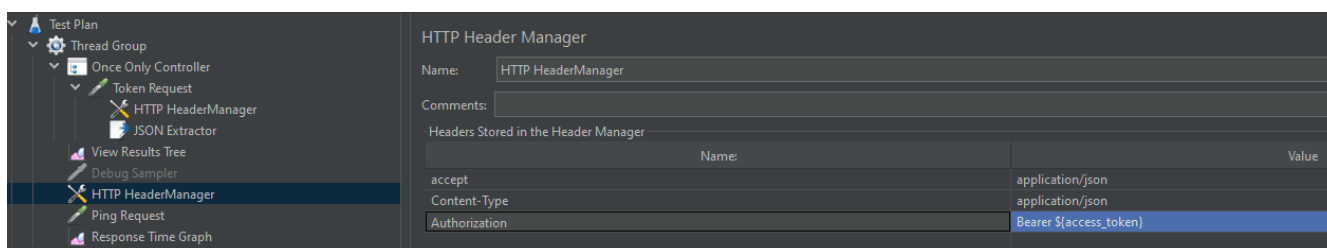
And from the response, also below Token Request, extract the JSON value access token into a Jmeter Variable access token using a JSON Extractor:



Add a sampler View Result Tree to confirm the results and a debug sampler if you like (in the results tree you will then be able to e.g. see the current variables when you click on the results of the debug sampler).

Run | Start should give you green entries in the results tree.

Now we will set the ordinary authentication as header: add another Header Manager outside of the Token request and add the variable as token, i.e. Authorization being Bearer \${access\_token}



You can then add a simple ping request in the thread group

and e.g. a Response time graph. You can then set the Thread group loop count to infinite, start the sampling and check the results tree.

HTTP Request

Name: Ping Request

Comments:

Basic Advanced

Web Server

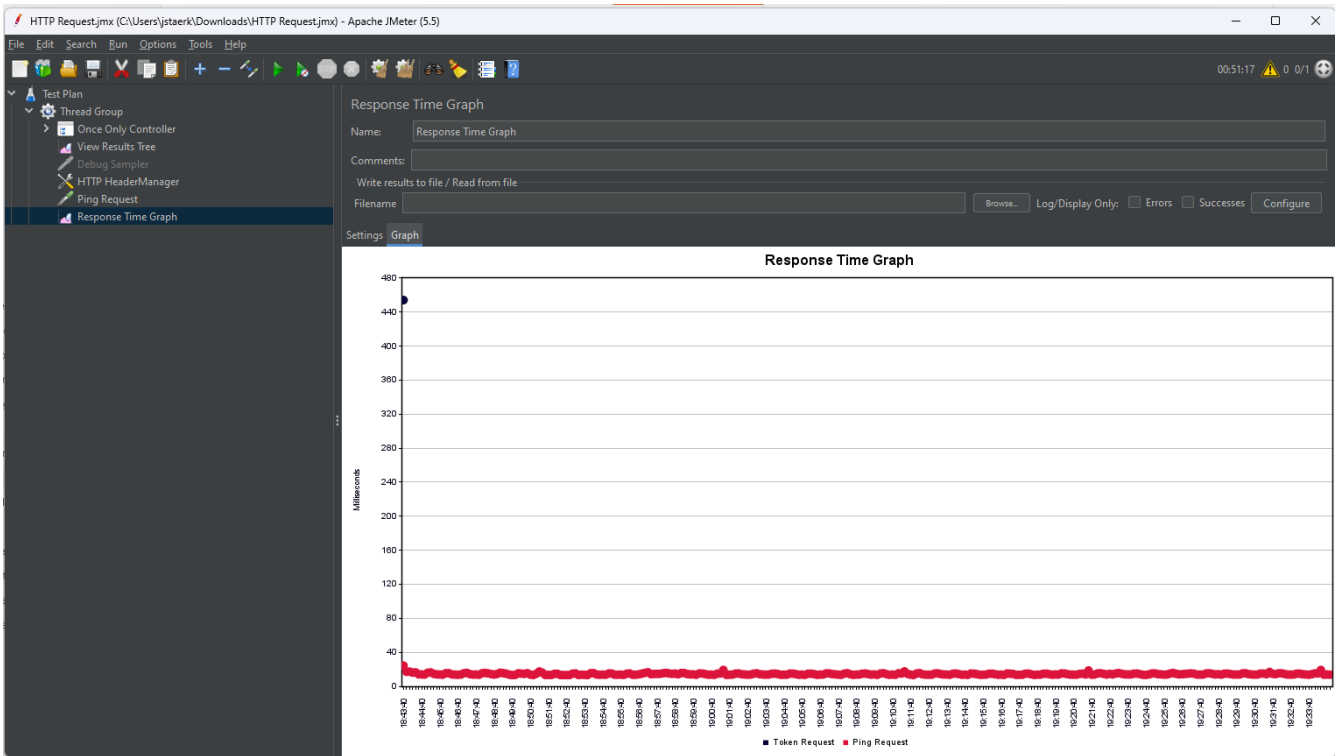
Protocol [http]: https Server Name or IP: gw.usegroup.de Port Number: 8243

HTTP Request

GET Path: mustang/v0.7.0/mustang/ping Content encoding:

Redirect Automatically  Follow Redirects  Use KeepAlive  Use multipart/form-data  Browser-compatible headers

After a while the response time graph will look like this, indicating the initial login took ~440ms and the usual response time to our „ping“ is ~20ms.



# Chapter 14. Terms of service

## 14.1. Evaluation terms

To test and evaluate the service a valid email address has to be provided. Unless otherwise agreed ([info@usegroup.de](mailto:info@usegroup.de)) test access is restricted to one account per legal entity, i.e. usually company. This email address will also be used to send availability, information about the roadmap, development and status with an expected maximum volume of one per week. You can terminate your test phase by unsubscribing from the announcements newsletter list. After the signup, access can then happen free of charge, with a limit of 1,000 operations/month, unless access is revoked by usegroup. You are not allowed to share personal data (e.g. real invoice recipient's names, addresses, email addresses, bank credentials or real invoice contents). Access may be revoked because the general test phase has ended, the test phase is over for a certain customer, or due to other terms which do not need to be disclosed. Under this test terms we also do not guarantee the availability nor the correctness of the service.

[https://api.usegroup.de:9443/authenticationendpoint/privacy\\_policy.do](https://api.usegroup.de:9443/authenticationendpoint/privacy_policy.do)

## 14.2. Production terms

To access Mustangserver productively including a data processing agreement a Mustang Pro license is required. Further info can be obtained at <https://www.mustangproject.org/pro/>

# Chapter 15. Troubleshooting

- The ping endpoint is intentionally simple and can be used to check basic functionality
- A HTTP response code 400 Post method not allowed on methods which do allow post may (temporarily) indicate a throttled user or subscription

# Chapter 16. Mustangserver Inhouse

## 16.1. (optional) Set up Sentry

Sentry is an optional centralized Exception Tracking System Mustangserver can send exceptions to. It requires 40gb HDD, 16gb RAM and at least 4 CPUs

### 16.1.1. Install docker

Recommended sizing: 2 Cores, 16GB Ram, 50GB HDD.

For Api Management and/or authentication server twice the amount. If you also want to run a S3 server +100GB of HDD.

```
sudo apt install curl git

sudo su
curl -sSL https://get.docker.com/ | CHANNEL=stable sh
# After the installation process is finished, you may need to enable the service and
make sure it is started (e.g. CentOS 7)
systemctl enable docker.service
systemctl start docker.service

curl -L https://github.com/docker/compose/releases/download/$(curl -Ls
https://www.servercow.de/docker-compose/latest.php)/docker-compose-$(uname -s)-$(uname
-m) > /usr/local/bin/docker-compose
chmod +x /usr/local/bin/docker-compose
```

### 16.1.2. Config

based on <http://develop.sentry.dev/self-hosted/>

```
VERSION=$(curl -Ls -o /dev/null -w %{url_effective} https://github.com/getsentry/self-
hosted/releases/latest)
VERSION=${VERSION##*/}
git clone https://github.com/getsentry/self-hosted.git
cd self-hosted
git checkout ${VERSION}
./install.sh
```

Adjust sentry/config.yml

```
system.url-prefix: 'https://sentry.usegroup.de'
```

edit sentry/sentry.conf.py, remove comments in front of ssl lines 255-258.

adjust settings for Mail Server ~l 90

```
mail.host: 'mail.usegroup.de'  
mail.port: 587  
mail.username: 'info@usegroup.de'  
mail.from: 'info@usegroup.de'  
mail.password: '<password/>'  
mail.use-ssl: false
```

### 16.1.3. Recommended hardware

For production systems 2 cores 16GB Ram and 50 GB HDD. For test systems at least half of that, in case an oAuth-Server or Api Management is deployed twice of that amount.

## 16.2. Run from Jar/War

```
java -jar mustangserver.war --spring.profiles.active=local  
-Dspring.profiles.active=local
```

Sentry will be used if at least an environment variable SENTRY\_AUTH\_TOKEN= is set and the default Sentry DSN can be overwritten if additionally a environment variable SENTRY\_DSN is set.

## 16.3. Run from Docker

If you bought the inhouse version: the container registry is dev.usegroup.de:5050 and the default port the server starts on is 8000

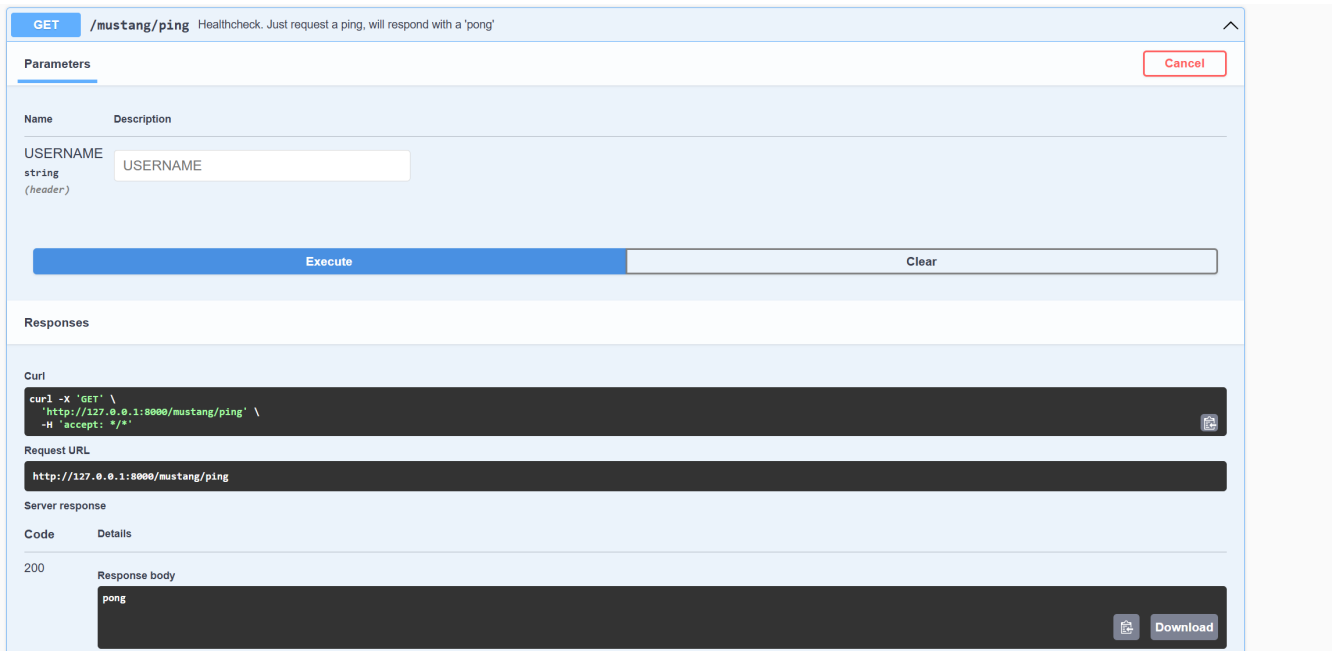
```
docker login dev.usegroup.de:5050 -u <username> -p <token>
```

```
docker run --name Mustangserver -e MUSTANG_SERVER_VERSION=1.8.2 -dp 8000:8000  
dev.usegroup.de:5050/internal/mustangserver:1.8.2
```

Afterwards you should be able to access

<http://<ip>:8000/swagger-ui/index.html>

and e.g. perform a ping like described above. You can leave username empty. The correct response to ping is „pong“.



By specifying additional `-e key=value` pairs (e.g. `docker run --name Mustangserver -e MUSTANG_SERVER_VERSION=1.8.2 -e mustang.allowedIPs=123.45.67.89 -p 8888:8000 dev.usegroup.de:5050/internal/mustangserver:1.8.2`) you can set config variables.

Available variables are

Config	Default	Description
server.port	8000	The port the OpenAPI HTML Client and backend operate on
mustang.allowedIPs		If specified, a comma-separated list of IPs who will be allowed to connect
mustang.oAuth	false	Off by default
mustang.additionalLog		Additional entries for the log line of the request, can e.g. be set to the instance's ID to allow a consolidated. Logs are stored in <code>/opt/mustangserver/log</code> and in a future version there may be a filebeat to be configured
keycloak.enabled	false	Almost never to be set to true, even if you connect to a keycloak server, if true it will start an keycloak server on its own
openapi.server-url	localhost	Endpoint URL published via swagger file
spring.security.oauth2.client.registration.keycloak.client-id	login-app	Oauth2 specific setting (if enabled)

Config	Default	Description
spring.security.oauth2.client.registration.keycloak.authorization-grant-type	authorization_code	Oauth2 specific setting (if enabled)
spring.security.oauth2.client.registration.keycloak.scope	openid	Oauth2 specific setting (if enabled)
spring.security.oauth2.client.provider.keycloak.issuer-uri	<a href="http://localhost:8080/realms/SpringBootKeycloak">http://localhost:8080/realms/SpringBootKeycloak</a>	Oauth2 specific setting (if enabled)
spring.security.oauth2.client.provider.keycloak.user-name-attribute	preferred_username	Oauth2 specific setting (if enabled)
spring.security.oauth2.resource-server.jwt.issuer-uri	<a href="http://localhost:8080/realms/SpringBootKeycloak">http://localhost:8080/realms/SpringBootKeycloak</a>	Oauth2 specific setting (if enabled)
message-from-application-properties	Die Anwendung wird in der Default Environment gestartet!	Will just be shown on the console
server.servlet.context-path		Usually not set at all but could be set to e.g. /api/v1
springdoc.api-docs.path	/api-docs	Where the openapi spec file will be found
springdoc.swagger-ui.path	/swagger-ui	Path of the HTML GUI
logging.config	classpath:logback-spring.xml	

Similarly, the REST-converter, a.k.a. Mustang-Mapper, i.e. the component to translate e.g. CII to UBL and vice versa can be started using

```
docker run --name REST-converter -dp 8000:8000 dev.usegroup.de:5050/internal/mustang-mapper:1.7.0
```

# Chapter 17. Sentry

You can setup to use a inhouse (or central) „Sentry“ Exception Tracking Server ,

# Chapter 18. Version history

Of this document:

0.7.0 on 2023-01-19 by Jochen.

0.8.0 on 2023-02-25 by Jochen: Added Mustangserver 0.8.0 (=Order-X)

0.8.1 on 2023-02-26 by Jochen: added C++-Client, PDF/A-param to PDF endpoint

1.0.0 on 2023-09-26 by Jochen: most recent endpoint, necessity to subscribe, split between mustangserver and mustangserver-docs, updated list of Ves-IDs, added change password url

1.1.0 added username field, exception handling, invoice2XML parameter standard was renamed to format. Better Exception handling. CombineXML now also allows PDF/A-3 input.

1.2.0 on 2024-01-31 /combineXML /parse and /invoice2XML now support XRechnung 3.0.1

1.3.0 on 2024-02-29 Endpoint /combine is now available again (combine JSON and PDF to fx), /phive has been updated, now auto-detects Ves-IDs if none specified and now also supports e.g. XR 3.0.1 (from 135 to 143 VesIDs). /xmltohtml and API keys documented. Mentioned Bruno.

1.3.1 on 2024-07-29 JSON structure documented, added Troubleshooting

1.4.0 added description of detach and xmltopdf endpoint and of C# sample client. Added section classes.

1.4.1 added chapter on Docker config for in-house server. Corrected timezone in example. Added BT Mapping and invoice class description.

1.4.2 Added paragraph on most recent versions and API keys, added examples for §19 UStG small businesses and intra-community supply. Added documentation for corrected invoices, cancellations and credit notes.

1.5.0 New in the server (2024-11-20) were improved UBL import, improved JSON return after parse (without empty elements), docker without SecurityAutoConfiguration and the valitool endpoint (not yet documented)

1.5.1 (2024-11-30) BankDetails and IncludedNotes work in the server, possibility to specify server address to be included in OpenAPI

1.6.0 (2024-12-30) File attachments work in the server, documented valitool and PDF, added and documented ignoreNotices parameter to validation. New UBL2CII/CII2UBL endpoints. Javascript example client documented. Added description of eesi/eigor, file attachments and includednotes.

1.7.0 (2025-08-20) Outsourced the list of PHIVE VES-Ids and the tutorials, added Sentry config, migrated to AsciiDoc, added the comprehensive example and swagger editor generated clients.

1.7.1 (2025-10-08) updated BT mapping table, added Mustang-Ghostscript

1.8.0 (2025-12-18) added Styled Invoice feature

1.8.1 (2026-05-19) updated BT mapping table, added predefined styled invoice templates

1.8.2 (2026-06-22) added documentation of the two new endpoints (pdf2pdfa and validationReportToPDF) and added inhouse system recommended hardware

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# Glossar

## ZUGFeRD

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