Guide for Installing and Setting up Mediawiki with Restbase and Mathoid

For this guide a clean install of Ubuntu Desktop 16.04 64-bit was used. In this guide we use Mediawiki 1.28.2, the procedure should however be similar to other versions of Mediawiki which support Restbase and Mathoid.

0. Setup Environment

Update and upgrade apt:

```
sudo apt update
sudo apt upgrade
```

Install/Setup Lamp server:

```
sudo apt install tasksel
sudo tasksel install lamp-server
#Set password for mysql
```

Install additional packages and tools:

```
sudo apt install php7.0-mbstring php7.0-xml php7.0-curl
# Restart Apache
sudo /etc/init.d/apache2 restart

sudo apt install git curl nodejs-legacy npm librsvg2-dev screen
```

1. Setup Mediawiki

Download Mediawiki

```
wget https://releases.wikimedia.org/mediawiki/1.28/mediawiki-1.28.2.tar.gz
```

Unpack and move

```
tar -xzf mediawiki-1.28.2.tar.gz
sudo mv mediawiki-1.28.2/* /var/www/html/
```

Setup wiki through Web Installer

Place generated LocalSettings.php into mediawiki installation folder

2. Downloading and Extracting Math Pages

For this installation of Mediawiki we shall be importing the math pages of the simple English Wikipedia Dump. For this purpose, we shall be using the tool WikiFilter developed by Moritz Schubotz to extract the pages containing mathematical formulas.

Download WikiFilter

```
git clone https://github.com/physikerwelt/wikiFilter
```

Add line at end of wikiFilter.py

```
split_xml( args.file, args.size, args.dir, args.tag, args.template)
```

Download and extract math pages

```
mkdir wout
wget https://dumps.wikimedia.org/simplewiki/latest/simplewiki-latest-pages-articles.xml.bz2
./wikiFilter.py -f simplewiki-latest-pages-articles.xml.bz2
```

3. Import dump into Mediawiki

Extract xml from bz2 file

```
cd wout
bzip2 -d chunk-1.xml.bz2
```

Import into mediawiki

```
sudo php /var/www/html/maintenance/importDump.php < chunk-1.xml
sudo php /var/www/html/maintenance/rebuildall.php
```

4. Install Math extension

Download math extension

```
wget https://extdist.wmflabs.org/dist/extensions/Math-REL1_28-1097ee7.tar.gz
```

Extract to extension folder

```
sudo tar -xzf Math-REL1_28-1097ee7.tar.gz -C /var/www/html/extensions
```

Add the following to LocalSettings.php

```
wfLoadExtension( 'Math' );
```

Run update.php

```
sudo php /var/www/html/maintenance/update.php
```

5. Setup Mathoid

Download and install Mathoid

```
git clone https://github.com/wikimedia/mathoid
cd mathoid
npm install
```

Run mathoid in screen

```
screen -S mathoidScreen
nodejs server.js
```

6. Setup Restbase

Download and install Restbase

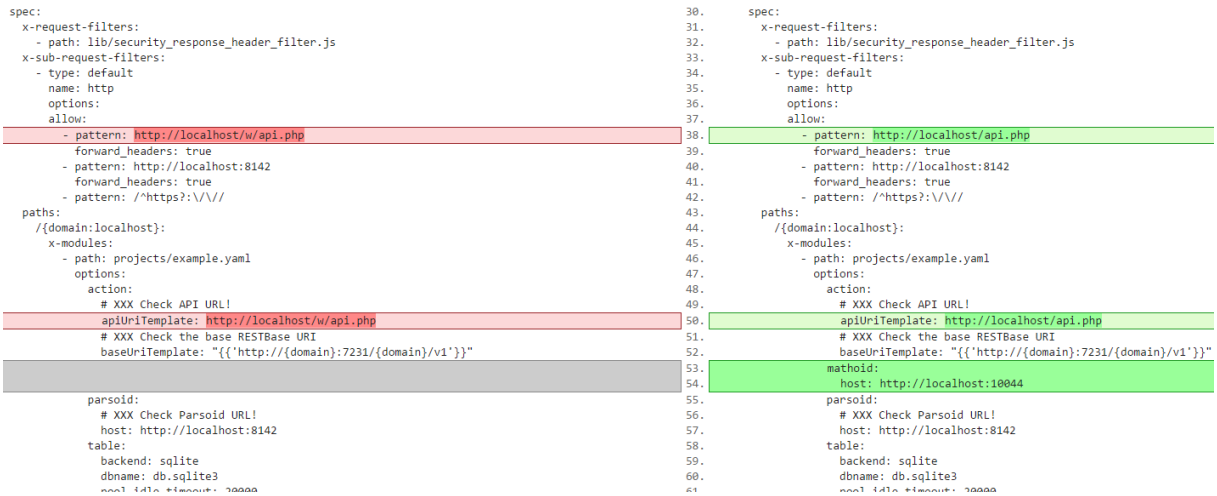
```
git clone https://github.com/wikimedia/restbase
cd restbase
npm install
```

The following steps describe the minimum changes that are needed to get restbase + mathoid up and running. We assume both mathoid and restbase are running locally. Adapt and adjust files to cover needs.

Copy the config file

```
cp config.example.yaml config.yaml
```

Adjust the Config file as shown below.



```
spec:
  x-request-filters:
    - path: lib/security_response_header_filter.js
  x-sub-request-filters:
    - type: default
      name: http
      options:
      allow:
        - pattern: http://localhost/w/api.php
          forward_headers: true
        - pattern: http://localhost:8142
          forward_headers: true
        - pattern: /^https?:\/\//
  paths:
    /{domain:localhost}:
      x-modules:
        - path: projects/example.yaml
          options:
            action:
              # XXX Check API URL!
              apiUriTemplate: http://localhost/w/api.php
              # XXX Check the base RESTBase URI
              baseUriTemplate: "{{'http://{domain}:7231/{domain}/v1'}}"

            parsoid:
              # XXX Check Parsoid URL!
              host: http://localhost:8142
            table:
              backend: sqlite
              dbname: db.sqlite3
```

```
spec:
  x-request-filters:
    - path: lib/security_response_header_filter.js
  x-sub-request-filters:
    - type: default
      name: http
      options:
      allow:
        - pattern: http://localhost/api.php
          forward_headers: true
        - pattern: http://localhost:8142
          forward_headers: true
        - pattern: /^https?:\/\//
  paths:
    /{domain:localhost}:
      x-modules:
        - path: projects/example.yaml
          options:
            action:
              # XXX Check API URL!
              apiUriTemplate: http://localhost/api.php
              # XXX Check the base RESTBase URI
              baseUriTemplate: "{{'http://{domain}:7231/{domain}/v1'}}"
            mathoid:
              host: http://localhost:10044
            parsoid:
              # XXX Check Parsoid URL!
              host: http://localhost:8142
            table:
              backend: sqlite
              dbname: db.sqlite3
```

1: Created using https://www.diffchecker.com

The file below reflects the changes as shown above.

```
# RESTBase config for small wiki installs
#
```

```
# - sqlite backend
# - parsoid at http://localhost:8142
# - wiki at http://localhost/w/api.php
#
# Quick setup:
# - npm install
#   If you see errors about sqlite, you might have to `apt-get install
#   libsqlite3-dev`.
# - cp config.example.yaml config.yaml
# - double-check and possibly modify lines marked with XXX, then start restbase with
#
#   node server
#
# - If all went well, http://localhost:7231/localhost/v1/page/html/Main_Page
# should show your wiki's [[Main Page]].

services:
  - name: restbase
    module: hyperswitch
    conf:
      port: 7231
      salt: secret
      default_page_size: 125
      user_agent: RESTBase
      ui_name: RESTBase
      ui_url: https://www.mediawiki.org/wiki/RESTBase
      ui_title: RESTBase docs
      spec:
        x-request-filters:
          - path: lib/security_response_header_filter.js
        x-sub-request-filters:
          - type: default
            name: http
            options:
            allow:
              - pattern: http://localhost/api.php
                forward_headers: true
              - pattern: http://localhost:8142
                forward_headers: true
              - pattern: /^https?:\/\//
        paths:
          /{domain:localhost}:
            x-modules:
              - path: projects/example.yaml
                options:
                  action:
                    # XXX Check API URL!
                    apiUriTemplate: http://localhost/api.php
                    # XXX Check the base RESTBase URI
                    baseUriTemplate: "{{'http://{domain}:7231/{domain}/v1'}}"
                  mathoid:
                    host: http://localhost:10044
                  parsoid:
                    # XXX Check Parsoid URL!
                    host: http://localhost:8142
                  table:
                    backend: sqlite
                    dbname: db.sqlite3
                    pool_idle_timeout: 20000
                    retry_delay: 250
                    retry_limit: 10
                    show_sql: false

# Finally, a standard service-runner config.
info:
  name: restbase

logging:
  name: restbase
  level: info
```

Adjust the example.yaml file (/projects/example.yaml)

2: Created using https://www.diffchecker.com

The file below reflects the changes as shown above.

```
        # RESTBase config for small wiki installs
        #
        # - sqlite backend
        # - parsoid at http://localhost:8142
        # - wiki at http://localhost/w/api.php
        #
        # Quick setup:
        # - npm install
        #   If you see errors about sqlite, you might have to `apt-get install
        #   libsqlite3-dev`.
        # - cp config.example.yaml config.yaml
        # - double-check and possibly modify lines marked with XXX, then start restbase with
        #
        #   node server
        #
        # - If all went well, http://localhost:7231/localhost/v1/page/html/Main_Page
        # should show your wiki's [[Main Page]].

        # First, we define some project templates. These are referenced / shared
        # between domains in the root_spec further down.
        paths:
          /{api:v1}:
            x-modules:
              - spec:
                  info:
                    version: 1.0.0
                    title: Wikimedia REST API
                    description: Welcome to your RESTBase API.
                  x-route-filters:
                    - path: ./lib/normalize_title_filter.js
                      options:
                        redirect_cache_control: '{{options.purged_cache_control}}'
                  paths:
                    /media:
                      x-modules:
                        - path: v1/mathoid.yaml
                          options: '{{options.mathoid}}'
                    /page:
```

```
                  x-modules:
                    - path: v1/content.yaml
                      options:
                        purged_cache_control: '{{options.purged_cache_control}}'
                    - path: v1/common_schemas.yaml # Doesn't really matter where to mount it.
                /transform:
                  x-modules:
                    - path: v1/transform.yaml
            options: '{{options}}'

        /{api:sys}:
          x-modules:
            - spec:
                paths:
                  /table:
                    x-modules:
                      - path: sys/table.js
                        options:
                          conf: '{{options.table}}'
                  /key_value:
                    x-modules:
                      - path: sys/key_value.js
                  /key_rev_value:
                    x-modules:
                      - path: sys/key_rev_value.js
                  /key_rev_latest_value:
                    x-modules:
                      - path: sys/key_rev_latest_value.js
                  /page_revisions:
                    x-modules:
                      - path: sys/page_revisions.js
                  /post_data:
                    x-modules:
                      - path: sys/post_data.js
                  /action:
                    x-modules:
                      - path: sys/action.js
                        options: '{{options.action}}'
                  /page_save:
                    x-modules:
                      - path: sys/page_save.js
                  /mathoid:
                    x-modules:
                      - path: sys/mathoid.js
                        options: '{{options.mathoid}}'
                  /parsoid:
                    x-modules:
                      - path: sys/parsoid.js
                        options:
                          parsoidHost: '{{options.parsoid.host}}'
                          response_cache_control: '{{options.purged_cache_control}}'
                  /events:
                    x-modules:
                      - path: sys/events.js
                        options: '{{merge({"skip_updates": options.skip_updates}, options.events)}}'

              options: '{{options}}'
```

In mathoid.yaml (/v1/mathoid.yaml) adjust uri paths eg. /Wikimedia.org/sys/key_value/mathoid.mml

The file below reflects the changes with all uris pointing to localhost

```
        # Mathoid - math formula rendering service
        tags:
          - name: Math
            description: formula rendering
        paths:
          /math/check/{type}:
            post:
              tags: ['Math']
              summary: Check and normalize a TeX formula.
              description: |
                Checks the supplied TeX formula for correctness and returns the
                normalised formula representation as well as information about
```

```
      identifiers. Available types are tex and inline-tex. The response
      contains the `x-resource-location` header which can be used to retrieve
      the render of the checked formula in one of the supported rendering
      formats. Just append the value of the header to `/media/math/{format}/`
      and perform a GET request against that URL.

      Stability: [stable](https://www.mediawiki.org/wiki/API_versioning#Stable).
    produces:
      - application/json
    parameters:
      - name: type
        in: path
        description: The input type of the given formula; can be tex or inline-tex
        type: string
        required: true
        enum:
          - tex
          - inline-tex
          - chem
      - name: q
        in: formData
        description: The formula to check
        type: string
        required: true
    responses:
      '200':
        description: Information about the checked formula
      '400':
        description: Invalid type
        schema:
          $ref: '#/definitions/problem'
      default:
        description: Error
        schema:
          $ref: '#/definitions/problem'
    x-monitor: true
    x-amples:
      - title: Mathoid - check test formula
        request:
          params:
            domain: localhost
            type: tex
          body:
            q: E=mc^{2}
        response:
          status: 200
          headers:
            content-type: /^application\/json/
            x-resource-location: /.+/
            cache-control: 'no-cache'
          body:
            success: true
            checked: /.+/
    x-request-handler:
      - get_from_sys:
          request:
            method: post
            uri: /localhost/sys/mathoid/check/{type}
            headers: '{{ request.headers }}'
            body: '{{ request.body }}'

  /math/formula/{hash}:
    get:
      tags: ['Math']
      summary: Get a previously-stored formula
      description: |
        Returns the previously-stored formula via `/media/math/check/{type}` for
        the given hash.

        Stability: [stable](https://www.mediawiki.org/wiki/API_versioning#Stable).
      produces:
        - application/json
      parameters:
        - name: hash
          in: path
          description: The hash string of the previous POST data
          type: string
          required: true
          minLength: 1
      responses:
```

```
        '200':
          description: Information about the checked formula
        '404':
          description: Data for the given hash cannot be found
          schema:
            $ref: '#/definitions/problem'
        default:
          description: Error
          schema:
            $ref: '#/definitions/problem'
      x-monitor: false
      x-request-handler:
        - get_from_sys:
            request:
              method: get
              uri: /localhost/sys/mathoid/formula/{hash}
              headers: '{{ request.headers }}'

  /math/render/{format}/{hash}:
    get:
      tags: ['Math']
      summary: Get rendered formula in the given format.
      description: |
        Given a request hash, renders a TeX formula into its mathematic
        representation in the given format. When a request is issued to the
        `/media/math/check/{format}` POST endpoint, the response contains the
        `x-resource-location` header denoting the hash ID of the POST data. Once
        obtained, this endpoint has to be used to obtain the actual render.

        Stability: [stable](https://www.mediawiki.org/wiki/API_versioning#Stable).
      produces:
        - image/svg+xml
        - application/mathml+xml
        - image/png
      parameters:
        - name: format
          in: path
          description: The output format; can be svg or mml
          type: string
          required: true
          enum:
            - svg
            - mml
            - png
        - name: hash
          in: path
          description: The hash string of the previous POST data
          type: string
          required: true
          minLength: 1
      responses:
        '200':
          description: The rendered formula
        '404':
          description: Unknown format or hash ID
          schema:
            $ref: '#/definitions/problem'
        default:
          description: Error
          schema:
            $ref: '#/definitions/problem'
      x-monitor: false
      x-setup-handler:
        - init_svg:
            uri: /localhost/sys/key_value/mathoid.svg
            body:
              keyType: string
              valueType: string
        - init_mml:
            uri: /localhost/sys/key_value/mathoid.mml
            body:
              keyType: string
              valueType: string
        - init_png:
            uri: /localhost/sys/key_value/mathoid.png
            body:
              keyType: string
              valueType: blob
      x-request-handler:
        - check_storage:
```

```
                    request:
                      method: get
                      uri: /localhost/sys/key_value/mathoid.{$.request.params.format}/{$.request.params.hash}
                      headers:
                        cache-control: '{{ cache-control }}'
                    catch:
                      status: 404
                    return_if:
                      status: '2xx'
                    return:
                      status: 200
                      headers: "{{ merge({ 'cache-control': options.cache-control }, check_storage.headers) }}"
                      body: '{{ check_storage.body }}'
                - postdata:
                    request:
                      uri: /localhost/sys/mathoid/formula/{request.params.hash}
                - mathoid:
                    request:
                      method: post
                      uri: /localhost/sys/mathoid/render/{request.params.format}
                      headers:
                        content-type: application/json
                        x-resource-location: '{{ request.params.hash }}'
                      body: '{{postdata.body}}'
```

Adjust the mathoid.js file (/sys/mathoid.js) as shown below

```
        Object.assign(ret.headers, { 'cache-control': this.options['cache-control'] });
        return ret;
    });
}

_invalidateCache(hyper, hash) {

    const routes = [];
    const uri = '//wikimedia.org/api/rest_v1/media/math/';

    routes.push(`${uri}formula/${hash}`);

    FORMATS.forEach((fmt) => {
        routes.push(`${uri}render/${fmt}/${hash}`);
    });

    return hyper.post({
        uri: new URI(['wikimedia.org', 'sys', 'events', '']),
        body: routes.map(route => ({
            meta: { uri: route }
        }))
    }).catch((e) => {
        hyper.log('warn/bg-updates', e);
    });
}

getFormula(hyper, req) {
    const rp = req.params;
    let hash = rp.hash;
    return hyper.get({
```

```
155.        Object.assign(ret.headers, { 'cache-control': this.options['cache-control'] });
156.        return ret;
157.    });
158.
159.}
160.
161._invalidateCache(hyper, hash) {
162.
163.    const routes = [];
164.    const uri = '//localhost/v1/media/math/';
165.
166.    routes.push(`${uri}formula/${hash}`);
167.
168.    FORMATS.forEach((fmt) => {
169.        routes.push(`${uri}render/${fmt}/${hash}`);
170.    });
171.
172.    return hyper.post({
173.        uri: new URI(['localhost', 'sys', 'events', '']),
174.        body: routes.map(route => ({
175.            meta: { uri: route }
176.        }))
177.    }).catch((e) => {
178.        hyper.log('warn/bg-updates', e);
179.    });
180.
181.}
182.
183.getFormula(hyper, req) {
184.    const rp = req.params;
185.    let hash = rp.hash;
186.    return hyper.get({
```

3: Created using https://www.diffchecker.com

The file below reflects the changes as indicated above.

```
'use strict';

const P = require('bluebird');
const HyperSwitch = require('hyperswitch');
const URI = HyperSwitch.URI;
const HTTPError = HyperSwitch.HTTPError;

const FORMATS = ['mml', 'svg', 'png'];

class MathoidService {
    constructor(options) {
        this.options = options;
    }

    checkInput(hyper, req) {
        const rp = req.params;
        let hash;
        let origHash;
        let checkRes;

        // start by calculating the hash
        return hyper.post({
            uri: new URI([rp.domain, 'sys', 'post_data', 'mathoid.input', 'hash']),
            body: { q: req.body.q, type: rp.type }
```

```
        }).then((res) => {
            hash = origHash = res.body;
            // short-circuit if it's a no-cache request
            if (req.headers && /no-cache/.test(req.headers['cache-control'])) {
                return P.reject(new HTTPError({ status: 404 }));
            }
            // check the post storage
            return hyper.get({
                uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.check', hash])
            }).catch({ status: 404 }, () => // let's try to find an indirection
                hyper.get({
                    uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.hash_table', hash])
                }).then((hashRes) => {
                    // we have a normalised version of the formula
                    hash = hashRes.body;
                    // grab that version from storage
                    return hyper.get({
                        uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.check', hash])
                    });
                }));
        }).catch({ status: 404 }, () => // if we are here, it means this is a new input formula
        // so call mathoid
        hyper.post({
            uri: `${this.options.host}/texvcinfo`,
            headers: { 'content-type': 'application/json' },
            body: {
                q: req.body.q,
                type: rp.type
            }
        }).then((res) => {
            checkRes = res;
            // store the normalised version
            return hyper.put({
                uri: new URI([rp.domain, 'sys', 'post_data', 'mathoid.input', '']),
                headers: { 'content-type': 'application/json' },
                body: {
                    q: res.body.checked,
                    type: rp.type
                }
            });
        }).then((res) => {
            let indirectionP = P.resolve();
            hash = res.body;
            // add the indirection to the hash table if the hashes don't match
            if (hash !== origHash) {
                indirectionP = hyper.put({
                    uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.hash_table',
                        origHash]),
                    headers: { 'content-type': 'text/plain' },
                    body: hash
                });
            }
            // store the result
            checkRes.headers = {
                'content-type': 'application/json',
                'cache-control': 'no-cache',
                'x-resource-location': hash
            };
            return P.join(
                hyper.put({
                    uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.check', hash]),
                    headers: checkRes.headers,
                    body: checkRes.body
                }),
                indirectionP,
                this._invalidateCache.bind(this, hyper, hash),
                () => checkRes
            );
        }));

    }

    _storeRenders(hyper, domain, hash, completeBody) {
        let idx;
        const len = FORMATS.length;
        const reqs = new Array(len);

        for (idx = 0; idx < len; idx++) {
            const format = FORMATS[idx];
            // ensure that we have a proper response for a given format
```

```
                if (!completeBody[format]
                        || !completeBody[format].headers
                        || !completeBody[format].body) {
                    return P.reject(new HTTPError({
                        status: 500,
                        body: {
                            type: 'server_error#empty_response',
                            description: `Math: missing or malformed response for format ${format}`
                        }
                    }));
                }
                // construct the request object that will be emitted
                const reqObj = {
                    uri: new URI([domain, 'sys', 'key_value', `mathoid.${format}`, hash]),
                    headers: Object.assign(
                        completeBody[format].headers, { 'x-resource-location': hash }),
                    body: completeBody[format].body
                };
                if (format === 'png' && reqObj.body && reqObj.body.type === 'Buffer') {
                    // for png, we need to convert the encoded data manually
                    // because we are receiving it wrapped inside a JSON
                    reqObj.body = new Buffer(reqObj.body.data);
                    completeBody[format].body = reqObj.body;
                }
                // store the emit Promise
                reqs[idx] = hyper.put(reqObj);
            }

            // invalidate the cache
            reqs.push(this._invalidateCache(hyper, hash));

            // now do them all
            return P.all(reqs).then(() => completeBody);

        }

        requestAndStore(hyper, req) {
            const rp = req.params;
            const hash = req.headers['x-resource-location'];

            // first ask for all the renders from Mathoid
            return hyper.post({
                uri: `${this.options.host}/complete`,
                headers: { 'content-type': 'application/json' },
                body: req.body
            }).then(res => // now store all of the renders
            this._storeRenders(hyper, rp.domain, hash, res.body)).then((res) => {
                // and return a proper response
                const ret = res[rp.format];
                ret.status = 200;
                Object.assign(ret.headers, { 'cache-control': this.options['cache-control'] });
                return ret;
            });

        }

        _invalidateCache(hyper, hash) {

            const routes = [];
            const uri = '//localhost/v1/media/math/';

            routes.push(`${uri}formula/${hash}`);

            FORMATS.forEach((fmt) => {
                routes.push(`${uri}render/${fmt}/${hash}`);
            });

            return hyper.post({
                uri: new URI(['localhost', 'sys', 'events', '']),
                body: routes.map(route => ({
                    meta: { uri: route }
                }))
            }).catch((e) => {
                hyper.log('warn/bg-updates', e);
            });

        }

        getFormula(hyper, req) {
            const rp = req.params;
```

```
                let hash = rp.hash;
                return hyper.get({
                    uri: new URI([rp.domain, 'sys', 'post_data', 'mathoid.input', hash])
                }).then((res) => {
                    res.headers['x-resource-location'] = hash;
                    return res;
                }).catch({ status: 404 }, () => // let's try to find an indirection
                    hyper.get({
                        uri: new URI([rp.domain, 'sys', 'key_value', 'mathoid.hash_table', hash])
                    }).then((hashRes) => {
                        // we have a normalised version of the formula
                        hash = hashRes.body;
                        // grab that version from storage
                        return hyper.get({
                            uri: new URI([rp.domain, 'sys', 'post_data', 'mathoid.input', hash])
                        }).then((res) => {
                            res.headers['x-resource-location'] = hash;
                            return res;
                        });
                    }));
            }
        }

        module.exports = (options) => {

            const mathoidSrv = new MathoidService(options);

            return {
                spec: {
                    paths: {
                        '/formula/{hash}': {
                            get: {
                                operationId: 'getFormula'
                            }
                        },
                        '/check/{type}': {
                            post: {
                                operationId: 'checkInput'
                            }
                        },
                        '/render/{format}': {
                            post: {
                                operationId: 'requestAndStore'
                            }
                        }
                    }
                },
                operations: {
                    getFormula: mathoidSrv.getFormula.bind(mathoidSrv),
                    checkInput: mathoidSrv.checkInput.bind(mathoidSrv),
                    requestAndStore: mathoidSrv.requestAndStore.bind(mathoidSrv)
                },
                resources: [
                    {
                        uri: '/{domain}/sys/post_data/mathoid.input'
                    }, {
                        uri: '/{domain}/sys/key_value/mathoid.hash_table',
                        body: { valueType: 'string' }
                    }, {
                        uri: '/{domain}/sys/key_value/mathoid.check',
                        body: { valueType: 'json' }
                    }
                ]
            };

        };
```

Run restbase in screen

```
screen -S restbaseScreen
nodejs server.js
```

Add the following lines to LocalSettings.php

```
$wgDefaultUserOptions['math'] = 'mathml';
$wgMathFullRestbaseURL= '<Link to your Restbase>';
```