BGmot Inc. (Canada)

Main principles of operations:

- OpenSource whenever it makes sense
- Automation whenever it is possible
- Zabbix ~~whenever it is~~... always ok… 99% cases
- We do things properly or don’t engage at all

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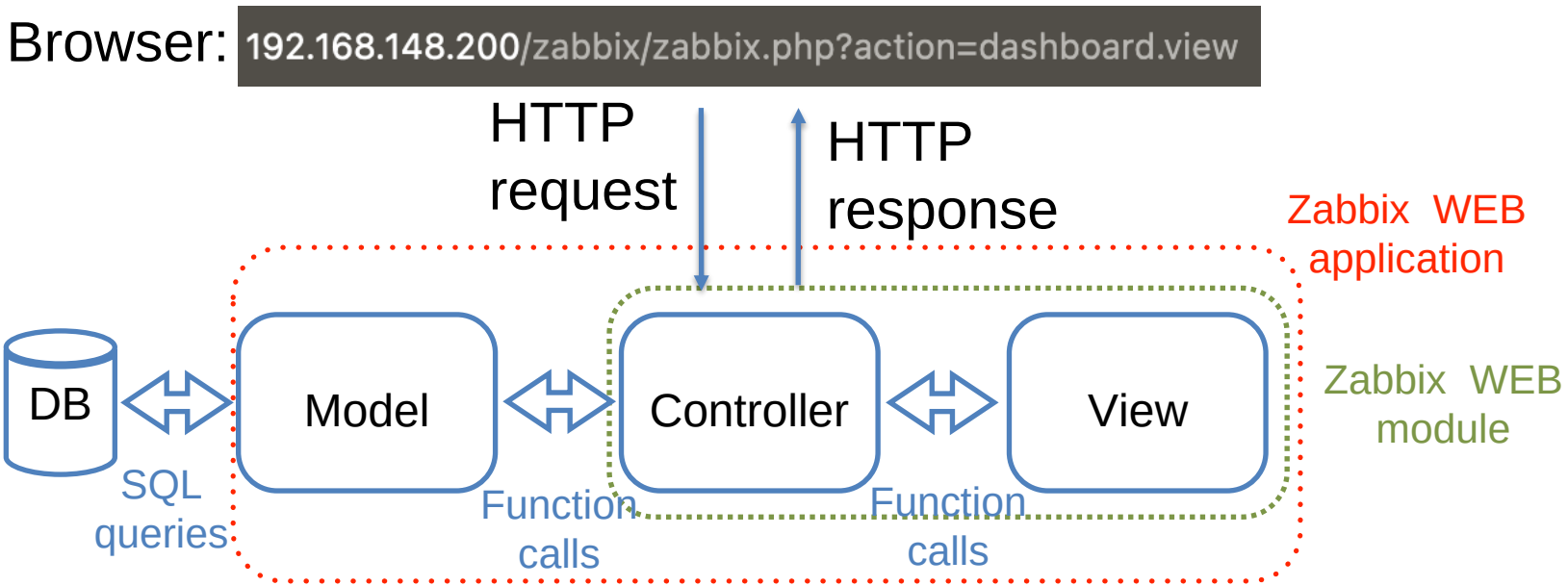
Zabbix Web Modules
MVC

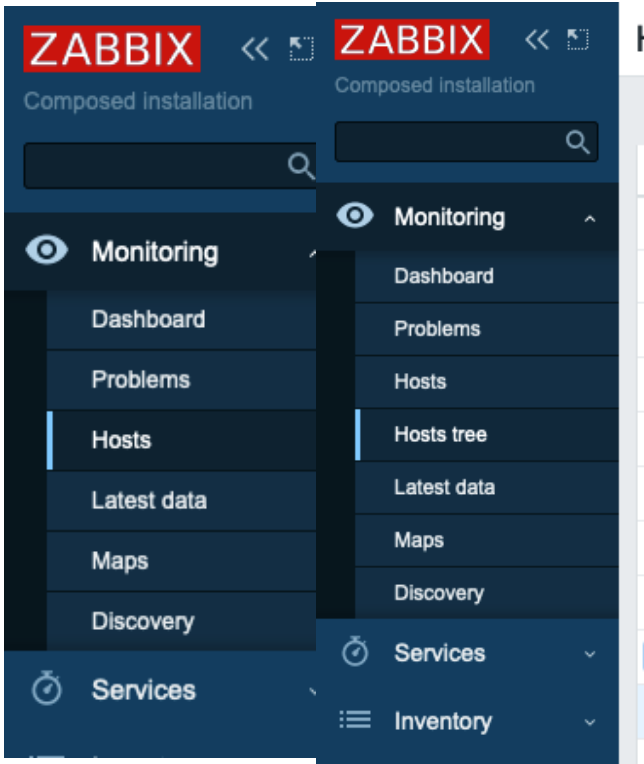
Model - Controller - View (MVC)

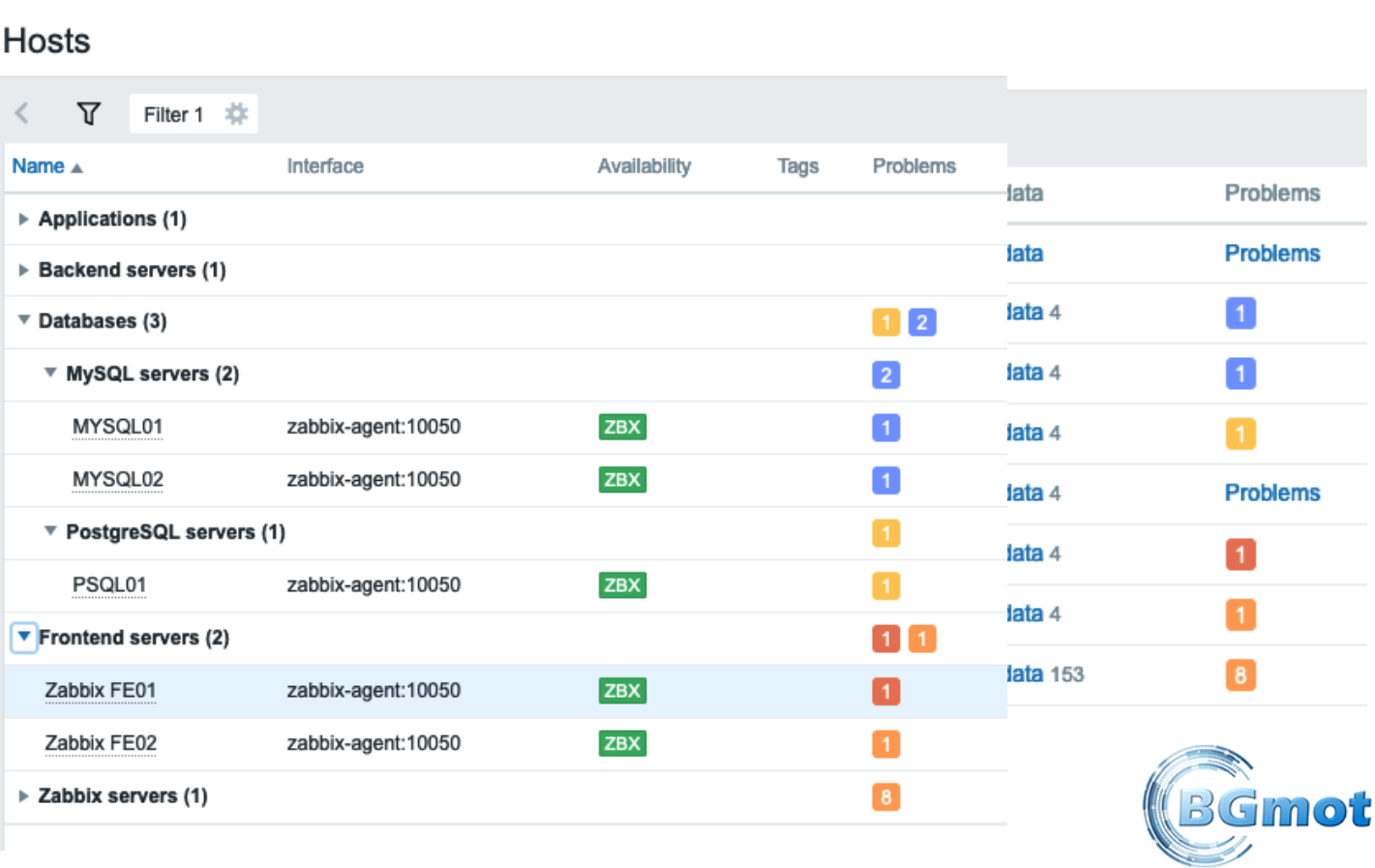


Zabbix does not use any third party MVC framework

Zabbix Web Modules

Example https://github.com/BGmot/zabbix-module-hosts-tree





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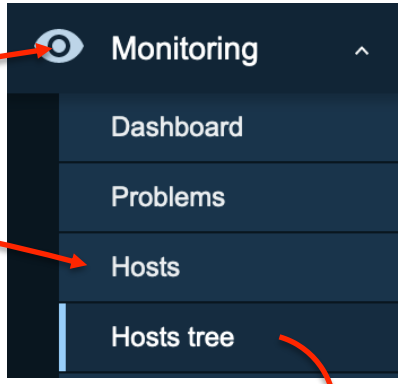
Zabbix Web Modules
Main menu

- Your module must be a child of Core\CModule class. init() method of all enabled modules is executed regardless of what menu item is selected so add your menu items defining what actions needs to be executed for this menu item here:

```
# ./modules/zabbix-module-hosts-tree/Module.php
class Module extends \Core\CModule {
   public function init(): void {
      APP::Component()->get('menu.main')
         ->findOrAdd(_('Monitoring'))
            ->getSubmenu()
               ->insertAfter('Hosts', (new \CMenuItem(_('Hosts tree')))
                  ->setAction('bghost.view')
               );
   }
```

```
# cat ./modules/zabbix-module-hosts-tree/manifest.json
{
    "actions": {
        "bghost.view": {
            "class": "CControllerBGHostView",
            "view": "module.monitoring.bghost.view"
        },
```



http://.../zabbix.php?action=bghost.view

Zabbix Web Modules
Action mapping

Request: 192.168.148.200:8080/zabbix.php?action=host.view

- What needs to be done for every action is defined in so called Router which is an array defined in ./include/classes/mvc/CRouter.php - for each action we see:
  - controller (a class that will be used to prepare data)
  - layout (in which form to present data generated by controller)
  - view (how to present/show the data to end-user/requestor)

```
private $routes = [
   // action                controller                        layout                view
   ...
   'host.view'    =>        ['CControllerHostView',          'layout.htmlpage',    'monitoring.host.view'],
```

- All “built-in” layouts are defined in these files:

```
./app/views/layout.csv.php
./app/views/layout.export.php
./app/views/layout.htmlpage.php
./app/views/layout.javascript.php
./app/views/layout.json.php
./app/views/layout.warning.php
./app/views/layout.widget.php
```

- You can define your own layouts in views folder of your module

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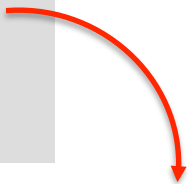
Zabbix Web Modules
Action mapping

- All actions defined in your module's manifest.json file are added to the Router:

```
# cat ./modules/zabbix-module-hosts-tree/manifest.json
{
    ...
    "actions": {
        "bghost.view": {
            "class": "CControllerBGHostView",
            "view": "module.monitoring.bghost.view"
        },
```



```
private $routes = [
   // action              controller                      layout                 view
   'host.view'    =>      ['CControllerHostView',         'layout.htmlpage',     'monitoring.host.view'],
   'bghost.view' =>       ['CControllerBGHostView',       'layout.htmlpage',     'module.monitoring.bghost.view'],
]
```

- Default layout is "layout.htmlpage".
- An action with same name defined in Module overwrites action definition in Zabbix.

Zabbix Web Modules

- Name of your controller file must match controller class and must be in actions/ folder.

```
# cat ./modules/zabbix-module-hosts-tree/manifest.json
{
    ...
    "actions": {
        "bghost.view": {
            "class": "CControllerBGHostView",
            "view": "module.monitoring.bghost.view"
        },
```

```
/usr/share/zabbix/modules/zabbix-module-hosts-tree# tree
.
|-- Module.php
|-- actions
|   |-- CControllerBGHost.php
|   |-- CControllerBGHostView.php
|   `-- CControllerBGHostViewRefresh.php
|-- manifest.json
|-- partials
|   |-- js
|   |   `-- monitoring.host.view.refresh.js.php
|   `-- module.monitoring.host.view.html.php
`-- views
    |-- js
    |   `-- monitoring.host.view.js.php
    |-- module.monitoring.bghost.view.php
    `-- module.monitoring.bghost.view.refresh.php
```

```
# ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php
class CControllerBGHostView extends CControllerBGHost {
```

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Zabbix Web Modules
Controller

- All Zabbix controllers can be found in ./app/controllers/ folder so as a starting point to work on my module I just copied ./app/controllers/CControllerHostView.php to my module's renaming according to my Controller class name ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php
- In my controller classes must be in my own namespace which defined in manifest.json:

```
# ./modules/zabbix-module-hosts-tree/manifest.json
{
  "namespace": "BGmotHosts",
```

```
# ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php

namespace Modules\BGmotHosts\Actions;

class CControllerBGHostView extends CControllerBGHost {
```

- Inheritance CControllerBGHostView << CControllerBGHost << CController

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Zabbix Web Modules
Controller

- First thing Zabbix does is calling your Controller's checkInput() method. It's the place where you can check that all the parameters passed in HTTP request are valid:

```
# ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php
class CControllerBGHostView extends CControllerBGHost {
       protected function checkInput(): bool {
              $fields = [
                     'name' =>       'string',
                     'groupids' =>   'array_id',
                     'status' =>     'in -1,'.HOST_STATUS_MONITORED.','.HOST_STATUS_NOT_MONITORED,
              ...
              $ret = $this->validateInput($fields);
              return $ret;
```

- All possible validation rules are defined in ./include/classes/validators/CNewValidator.php.

```
# grep "case '" ./include/classes/validators/CNewValidator.php
                              case 'not_empty':
                              case 'json':
                              case 'in':
                              ...
                              case 'array_id':
                              ...
```

Zabbix Web Modules
Controller

- If checkInput() method returns **true** (input valid) then doAction() of your Controller is called. All data preparation happens here. At the end you need to prepare one massive associative array (usually it is named $data) and return it as shown here:

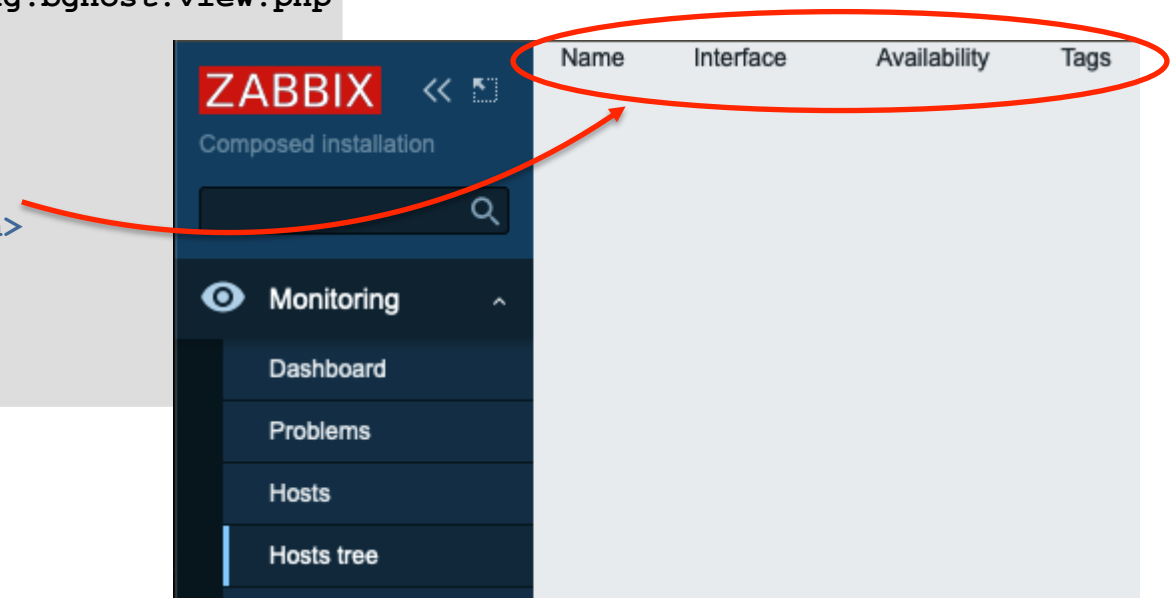
```
# ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php
protected function doAction(): void {
    ...
    $data = [ ... ];
    $response = new CControllerResponseData($data);
    $response->setTitle(_('Hosts'));
    $this->setResponse($response);
}
```

- What you put into associative array $data will be available later in your View code.

Zabbix Web Modules
View

- Zabbix constructs CView class (defined in ./include/classes/mvc/CView.php) and then simply calls its getOutput() method which in turn performs PHP include of your view file, i.e. “executing” the file.
- You can put pure HTML/CSS into the view .php file but it’s… meh…. Ugly!

```
./views/module.monitoring.bghost.view.php
<table width=300px>
 <thead>
  <tr>
    <th>Name</th>
    <th>Interface</th>
    <th>Availability</th>
    <th>Tags</th>
  </tr>
 </thead>
</table>
```



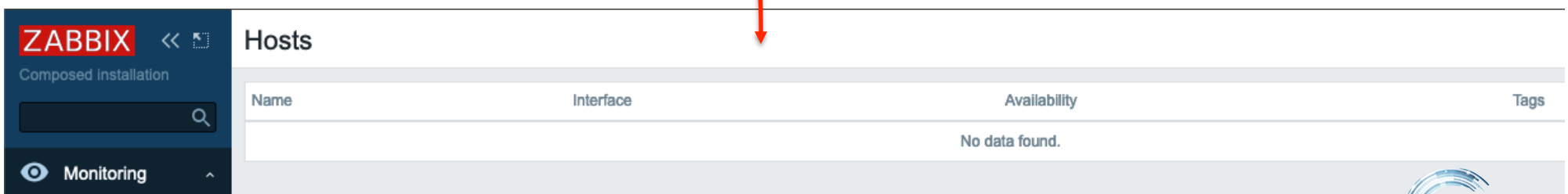
Zabbix Web Modules
View

- … or you can (and you should!) use standard Zabbix HTML classes

```
<?php
$widget = (new CWidget())
        ->setTitle(_('Hosts'));
$table = (new CTableInfo());
$table->setHeader([
        (new CColHeader(_('Name'))),
        (new CColHeader(_('Interface'))),
        (new CColHeader(_('Availability'))),
        (new CColHeader(_('Tags')))
]);
$widget->addItem($table);
$widget->show();
?>
```

- Look at the source code how to use these classes. See the list of all out-of-the-box classes for different HTML elements here:

```
# ls -1 ./include/classes/html/
CActionButtonList.php
CBarGauge.php
CButton.php
CButtonCancel.php
...
```



Zabbix Web Modules
View

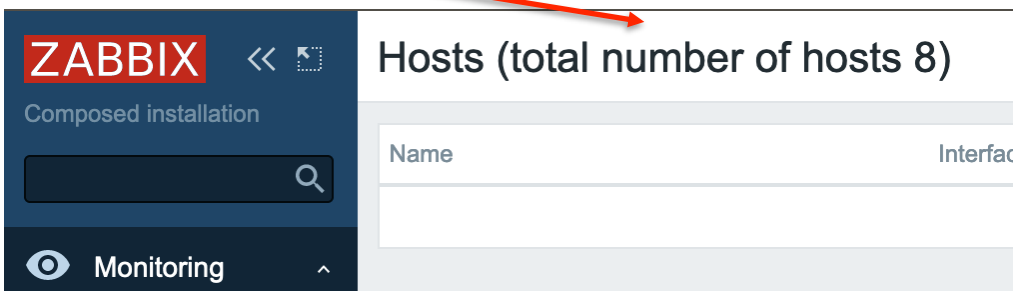
- All the data you prepared in Controller are available in View.

Controller:

```
# ./modules/zabbix-module-hosts-tree/actions/CControllerBGHostView.php
protected function doAction(): void {
    $data = [ 'hosts_count' => API::Host()->get(['countOutput' => true]) ];
    $response = new CControllerResponseData($data);
    $this->setResponse($response);
}
```

View:

```
# ./views/module.monitoring.bghost.view.php
<?php
    $widget = (new CWidget())
        ->setTitle('Hosts (total number of hosts ' . $data['hosts_count'] . ')');
...
```



Zabbix Web Modules
View - CSS and JavaScript

- If you want to add some CSS files to the page do it in your View code this way:

```
# ./views/module.monitoring.bghost.view.php
$this->addCssFile('modules/zabbix-module-hosts-tree/views/css/mycool.css');
```

  Your CSS file should not contain <style> tags, just pure CSS.

- You can use addJsFile() method only to add JS files that come with Zabbix and located in root /js folder, e.g.:

```
# ./views/module.monitoring.bghost.view.php
$this->addJsFile('multiselect.js');
```

- To include your JavaScript code use this function, note this .php file, not JS.

```
# ./views/module.monitoring.bghost.view.php
$this->includeJsFile('monitoring.host.view.js.php', $data);
```

  - this .php file will be searched by Zabbix in the ./views/js subdirectory of your module and must “print” JavaScript code.
  - A copy of $data variable will be available for using within the file.

Zabbix Web Modules
View - onBeforeAction() and onTerminate()

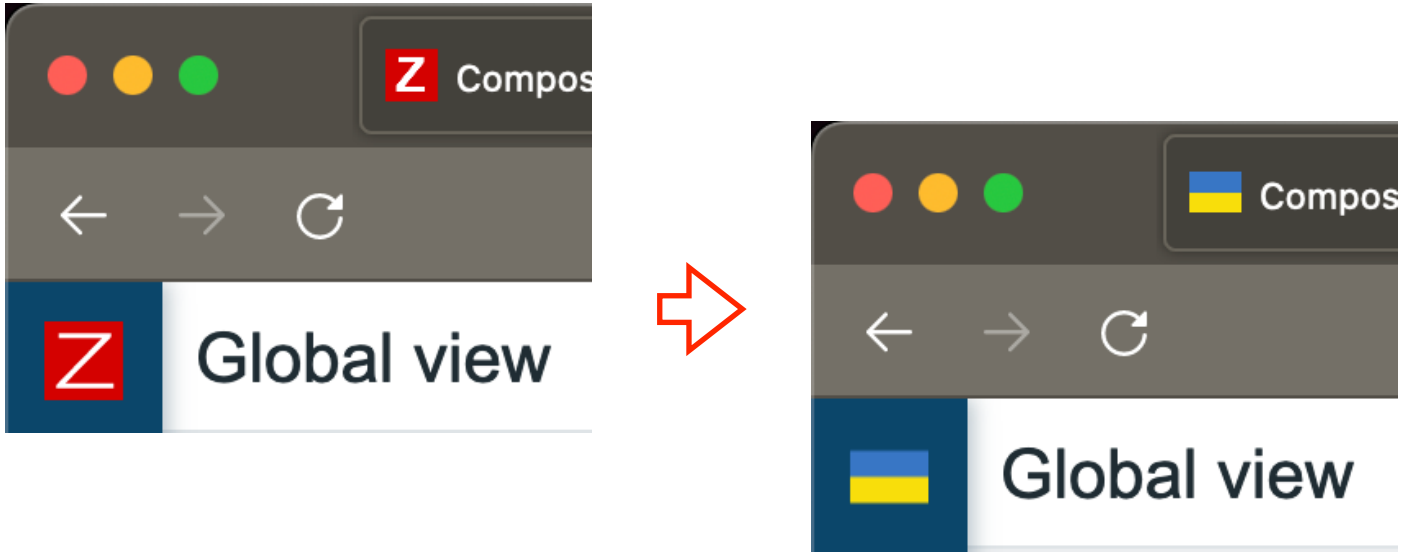
- Two special methods you can define in your module's controller (Module.php): onBeforeAction() and onTerminate().
- onBeforeAction() is executed before code execution passed to your module's controller and whatever you "print" in this method will be put directly after <head> tag in final HTML page returned to browser.
- onTerminate() is executed the last (right before PHP interpreter exist). You can access to data generated in Controller ($data) using this code:

```
# ./Module.php
public function onTerminate(CAction $action): void {
    $action_name = $action->getAction();
    if ($action_name === 'bghost.view') {
        $data = $action->getResponse()->getData();
```

Whatever you "print" in onTerminate() method will be put right before closing </body> tag in final HTML page returned to browser.

Zabbix Web Modules
View - onBeforeAction() and onTerminate()

- BeforeAction() and onTerminate() methods of all enabled modules executed regardless of menu item selected by end user so you can change Zabbix UI globally. I used this “feature” in my module that does not have any Controllers and Views:
  https://github.com/BGmot/zabbix-module-peace



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Zabbix Web Modules

My modules: https://github.com/stars/BGmot/lists/zabbix-modules

Full modules with Controllers and Views (add additional menu items):

- https://github.com/BGmot/zabbix-module-hosts-tree
- https://github.com/BGmot/zabbix-module-avail-report
- https://github.com/BGmot/zabbix-module-latest-data

Very simple modules (affect Zabbix UI as a whole):

- https://github.com/BGmot/zabbix-module-menu
- https://github.com/BGmot/zabbix-module-peace

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