Activity Providers for Inven!RA

Leonel Morgado, Fernando Cassola

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Activity Providers vs. activities

In the Inven!RA architecture, an inventive activities plan (IAP) maps analytics from various activities to overall plan goals. The activities are provided by third-parties, external to the platform implementing the Inven!RA architecture. Those third parties are referred to as Activity Providers (Cota et al., 2021).
An *Activity Provider* can register with Inven!RA different activities, by providing for each a registration file and providing its matching Web services, specified in that file (Grilo, 2022).

Activity registration file

The registration file follows a JSON format, with the following structure.
The Activity Provider must ensure the operation of all URLs mentioned in this file.
− *name*: Activity name;

− *config_url:* URL for the Activity Provider page that enables activity configuration;

− *json_params_url:* URL for a Web service returning a JSON format list, which identifies the elements of the configuration page where Inven!RA can harvest the configuration parameters;

− *user_url:* URL for a Web service that enables deploying the activity, by receiving as parameter an Inven!RA instance identifier;

− *analytics_url:* URL for a Web service that returns analytics values for all users of a specific instance of this activity in Inven!RA, provided as a parameter;

− *analytics_list_url:* URL for a Web service returning the list of analytics that the Activity Provider will collect.

Example:
```
{
"name": "Interesting activity",
"config_url": "http://<domain>/activity-configuration.html",
"json_params_url": "http://<domain>/json-params-for-activity",
"user_url": "http://<domain>/deploy-activity",
"analytics_url": "http://<domain>/activity-analytics",
"analytics_list_url": "http://<domain>/activity-analytics-list"  }
```

Activity configuration page and its parameters

The platform implementing the Inven!RA architecture accesses the *config_url* provided in the registration file, so that the user (teacher/trainer/learning designer) can configure an instance of the activity, or when including it in an IAP (inventive activities plan).
The page returned by *config_url* is presented to the user within the Inven!RA platform interface (Fig. 1).
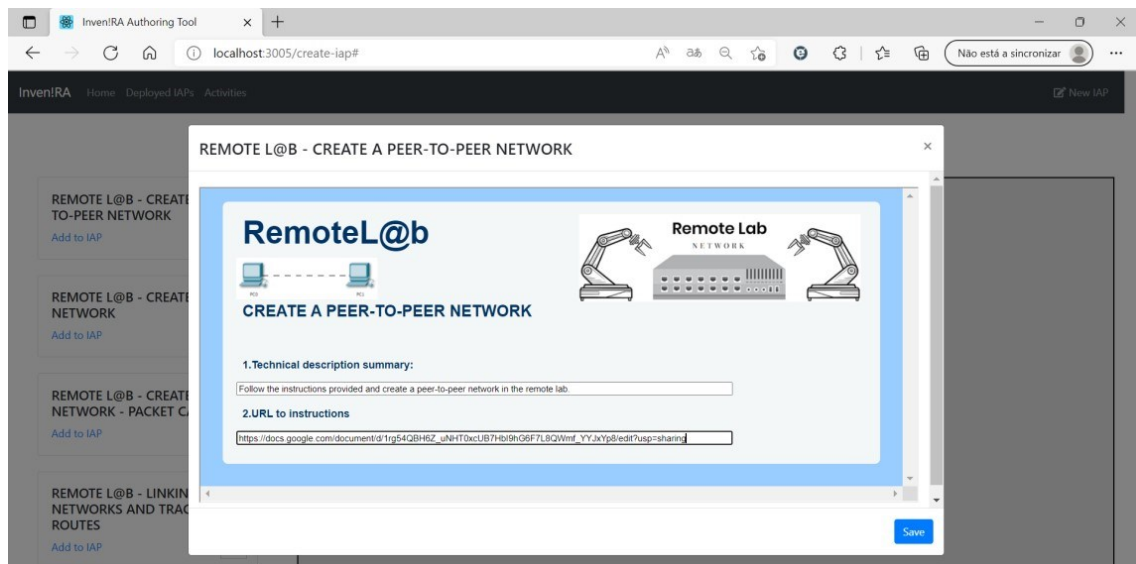
Figure 1 – Page provided by config_url included in the interface of a platform implementing the Inven!RA architecture (Grilo, 2022, p. 119).

In the Figure 1 example, there are two text fields that the teacher/trainer/learning designer can fill in: a technical description summary for the activity, and an URL to a Web page with details instructions. These fields are indicated in the *json_params_url* service, e.g.:

```
[
        {"name": "summary", "type": "text/plain"},
        {"name": "instructions", "type": "text/plain"}
]
```

This JSON enables platforms implementing the Inven!RA architecture to know that the configuration parameters need to be harvested from those two fields: "summary" and "instructions". Inven!RA then saves the parameters for that activity, alongside the IAP where it was included.

There is no requirement for these values to be visible or editable. For instance, the configuration page can be a videogame where the teacher/trainer/learning designer makes any necessary choices, and that leads to the adequate values being stored in HTML fields with an "hidden" attribute, so that they are not presented on-screen. The only requirement is that the Inven!RA platform can harvest those values.

Available analytics for an activity

A user (teacher/trainer/learning designer) includes an activity in an IAP and configures it, as mentioned in the previous section. Afterwards, that user can indicate which of the analytics collected by that activity are to be tracked, and maps them to the overall IAP objectives.

The Inven!RA platform presents to this user the available analytics of that activity, by using the *analytics_list_url* service, provided in the registration record.

This is a sample of the JSON format response from that service:

```
 {
  "qualAnalytics": [
   {"name": "Analytic 1", "type": "text/plain"},
   {"name": "Analytic 2", "type": "URL"}
  ],
  "quantAnalytics": [
   {"name": "Analytic 3", "type": "boolean"},
   {"name": "Analytic 4", "type": "integer"}
  ]  }
```

Activity deployment

The Web service indicated in *user_url*, in the registration file, receives from Inven!RA as a parameter an activity instance identifier. When called by Inven!RA, it must internally (within the Activity Provider) initiate all actions required to instantiate it internally, and be able to start collecting its analytics.

The result of a call to *user_url* is another URL, generated by the Activity Provider, which Inven!RA will user whenever users want to access this activity instance. Inven!RA does so by calling this URL with its configuration parameters (harvested from the configuration page) and with an Inven!RA user identifier.

Here are three examples of results from calling *user_url*:

```
http://<domain>/activity12345
```

```
http://<domain>/activity/12345
```

```
http://<domain>/activity?id=12345
```

To call this return URL, Inven!RA uses the POST method of the HTTP protocol, with the following request contents: the activity instance identifier, the Inven!RA user identifiers (student/trainee), and the configuration parameters harvested from the configuration page:

```
{
 "activityID": "This text is an activity instance identifier in Inven!RA",
 "Inven!RAstdID": "This text is a user identifier in Inven!RA",
 "json_params": {
  "s1" : "Configuration Parameter 1",
  "s2" : "Configuration Parameter 2",
  "s3" : "Configuration Parameter 3"
 }
}
```

The response must be the URL to which the user (student/trainee) will be redirected by Inven!RA. This URL contains that parameters required by the Activity Provider to register the users' analytics for that specific activity instance (activityID and Inven!RAstdID), both for its first access and later ones.

Getting the analytics for an activity

When Inven!RA requests from an Activity Provider the analytics it collected, regarding all users of an activity instance, it issues an HTPP POST request to the *analytics_url* service, identifying that instance:

```
{
   "activityID": "This text is an instance identifier for the activity in Inven!RA"
}
```

The Activity Provider responds with data in JSON format, providing all the collected analytics for that activity instance, for all users. For example:

```
[
 {
  "inveniraStdID": "1001",
  "quantAnalytics": [
   {"name": "Analytic 1", "type": "boolean", "value": true},
   {"name": "Analytic 2", "type": "integer", "value": 234}
  ],
  "qualAnalytics": [
   {"name": "Analytic 3", "type": "text/plain", "value": "text"},
   {"name": "Analytic 4", "type": "URL", "value": "http://<address>/1001"}
  ]
 },
 { //other users }
```

]

References

Cota, D., Cruzeiro, T., Beck, D., Coelho, A., & Morgado, L. (2021). InventiveTr@ining– Inven!RA architecture Activity Provider modules for online tracking of microelectronics student. *Revista de Ciências da Computação*, 113-136.

Grilo, R. (2022). *Laboratórios remotos – Interação remota com braços robóticos e integração com plataformas de e-learning* [Masters' Dissertation]. Master Program in Informatics Engineering and Web Technology. Lisbon, Portugal: Universidade Aberta.