Semantic Service Discovery

Published 2014-10-28 | (Compatible with SDK 4.5 and 2013 models)

> The way to API using Service explorer

Contents

When a user inputs a keyword in Service Explorer, the Semantic Service Discovery function searches services semantically with keyword and its results are displayed. The results include 3 rd party web services and Samsung SDK Library APIs related to the given keyword.

Service Discovery

Service discovery function provides two types of search. They are semantic service search and keyword-based service search. For keyword-based service search, a user can specify the search condition with seven prefix types in the figure below
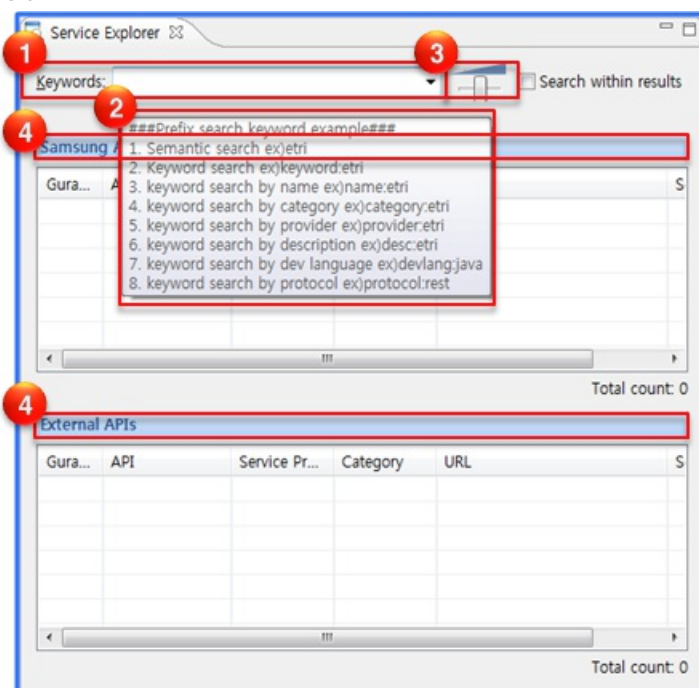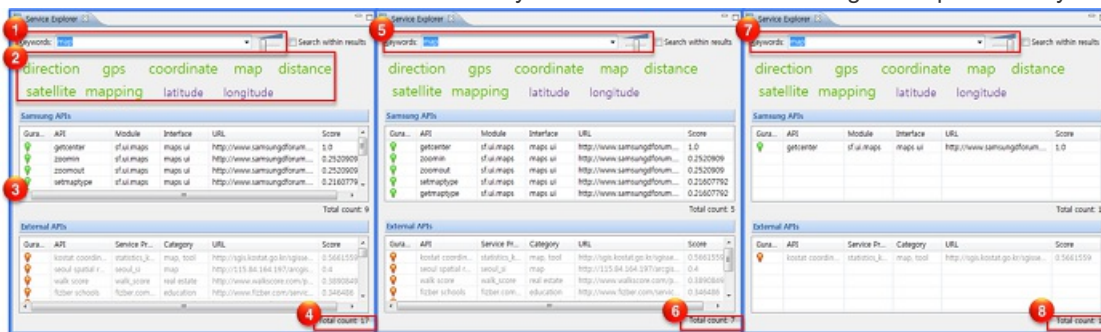

Figure: Web Services search screen

1. A user can input keyword in Keyword text field.

2. When the mouse cursor is moved over the Keyword label or input field, help about the keyword input information (No. 1 ~ 8) is popped-up in Service Explorer. The help menu shows the one **Semantic service search** (No. 1) and seven keyword-based service search methods (No.2 ~ 8). **Semantic service search** doesn't need any prefix.

3. Before performing **Semantic service search** with a keyword, a user can adjust levels of semantic search. The level of semantic search is a search option that signifies relevance score of the discovered services in the result table. The relevance score is computed basically by Apache Lucene's scoring which combines Boolean model (BM) of Information Retrieval with Vector Space Model (VSM) of Information Retrieval. The selection of the first level (score: 0.1) will display the results which have scores over 0.1. In the second level, the results over 0.2 score will be shown in the result table. With the highest level, only services over score 0.5 are delivered as search result. The higher the level is, the less result is shown.

4. When a user inputs a keyword and presses **Enter**, the results are displayed in the result tables of Samsung API and External API, respectively.

Semantic service search

A user can search services related a keyword given by himself even the keyword is not included in any information of the service. The results are searched and ranked by a semantic service search algorithm provided by Samsung.

**Figure**: Semantic service search screen

An example of semantic service search with a keyword map is as follows:

1. Input the map in the Keyword field, push the sliding bar to the leftmost, and press **Enter**.
2. As a search result, up to 10 tags expanded from a map are displayed in a Service Explorer area.
3. Also, the services related to a keyword map is displayed in tables of Samsung APIs and External APIs. The search results consists of brief service information columns such as API name, Module name, Interface name, information URL, Service provider, Service Category, and Score. The information columns can be sorted in ascending/descending order. The **Score** is the relevance score of the discovered services according to the given keyword. The results are ranked basically by Apache Lucene's scoring which combines Boolean model (BM) of Information Retrieval with Vector Space Model (VSM) of Information Retrieval. After query expansion using domain ontologies, it performs multi-field matching by manipulating the expanded query, and service re-ranking based users' usage history. If the URL is clicked, the contents of the related URL will be displayed on the internal/external web browser. The characters in black color on the search results refer to the service that provides the sample code snippet. The sample code snippet can be inserted into the editor via dragging & dropping.
4. The total number of results is 17 in case of External APIs.
5. Move the sliding bar to the center and press **Enter** in the keyword filed. It provides more filtered results than those of the previous search with the same keyword.
6. The total number of results is 7 in case of External APIs.
7. Move the sliding bar to the rightmost and press **Enter** in the keyword field. It provides the most filtered results than those of the previous search with the same keyword.
8. The total number of results is 1 in case of External APIs and 0 in Samsung APIs.

Tag Cloud

The expanded words from input keyword are displayed in Tag Cloud area as a result of semantic service search. In Tag Cloud area, words(tags) are represented in three different colors. The green-colored word means synonym of the input keyword, the purple-colored word represents hypernym of the input keyword, and the red-colored word indicates hyponym of the input keyword. They are modeled in the keyword ontology provided by Samsung. As shown in the figure below, clicking

any word in a Tag Cloud can perform keyword-based service search with the clicked word.
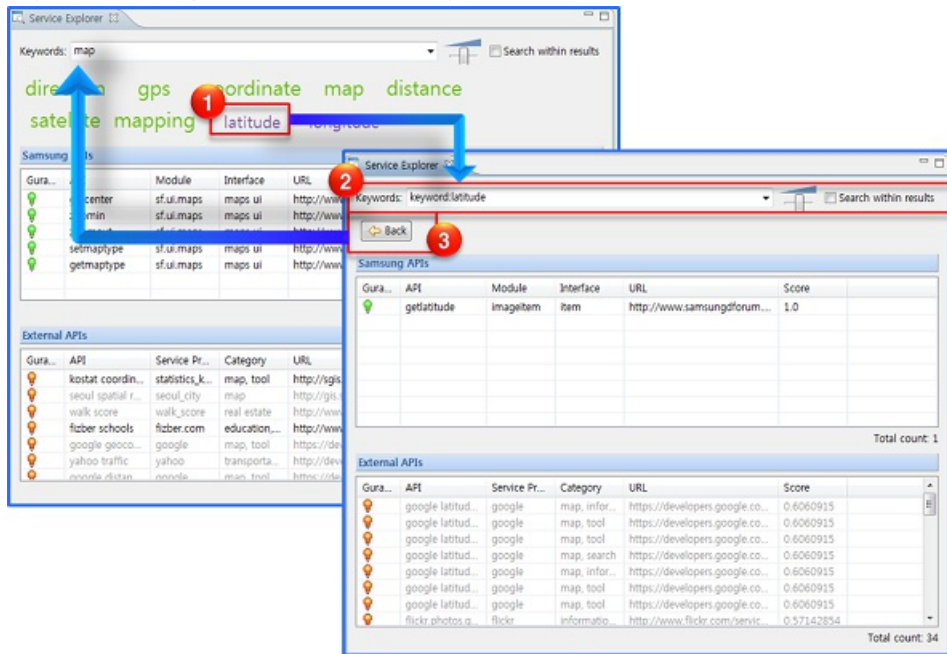

Figure: Tag cloud result screen

An example of keyword-based service search by clicking a word in Tag Cloud is as follows:

1. Click a **latitude** which was expanded from a map.
2. Keyword-based service search for the clicked keyword **latitude** is carried out, and the result of keyword-based service search is shown.
3. When **Back** button is pressed, the result window goes back to the results of the previous semantic service search with a map.

Keyword-based service search

Search by keyword

The services that have any information such as as API name, module, interface, or category including the input keyword are searched.
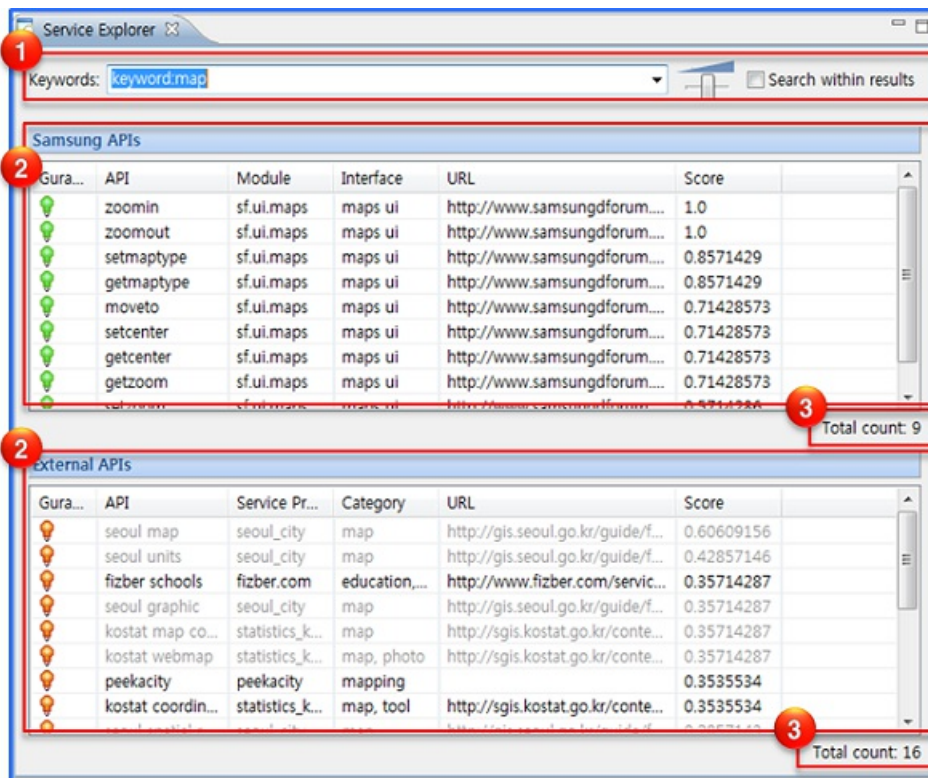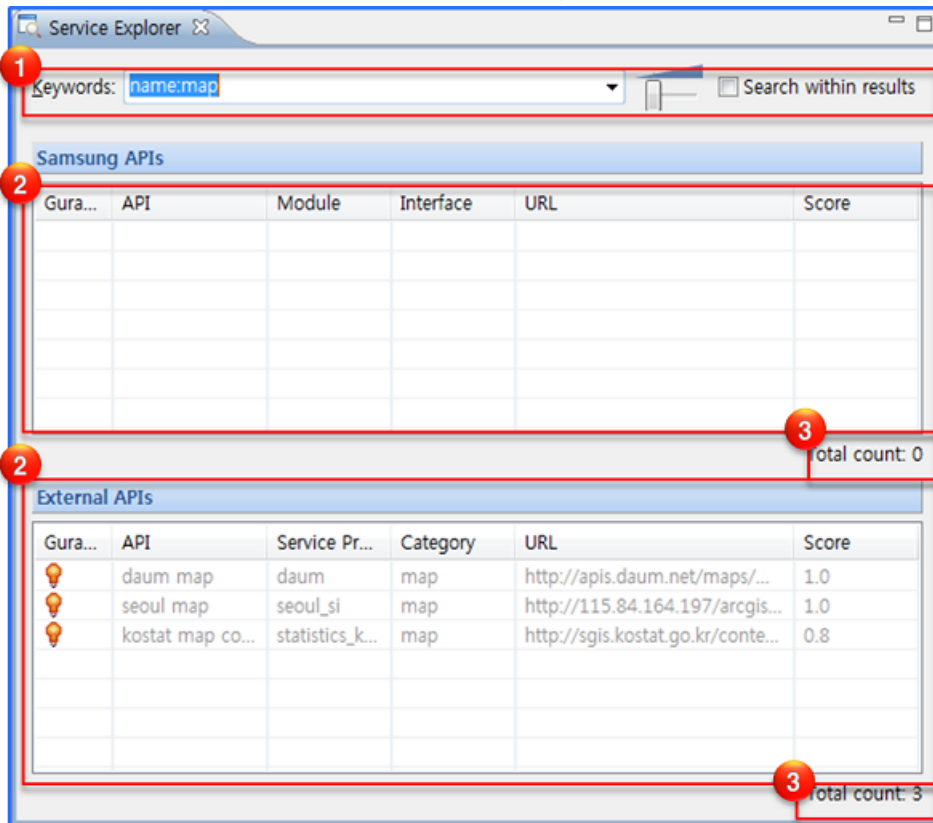

Figure: Search by keyword

The following section shows an example.

1. Input keyword:map and press **Enter**.
2. The services that have "map" literally in their information such as API name, module, interface, or category are retrieved in the result tables of Samsung APIs and External APIs, respectively.
3. The number of the retrieved services in Samsung APIs and External APIs are shown, respectively.

Search by Name

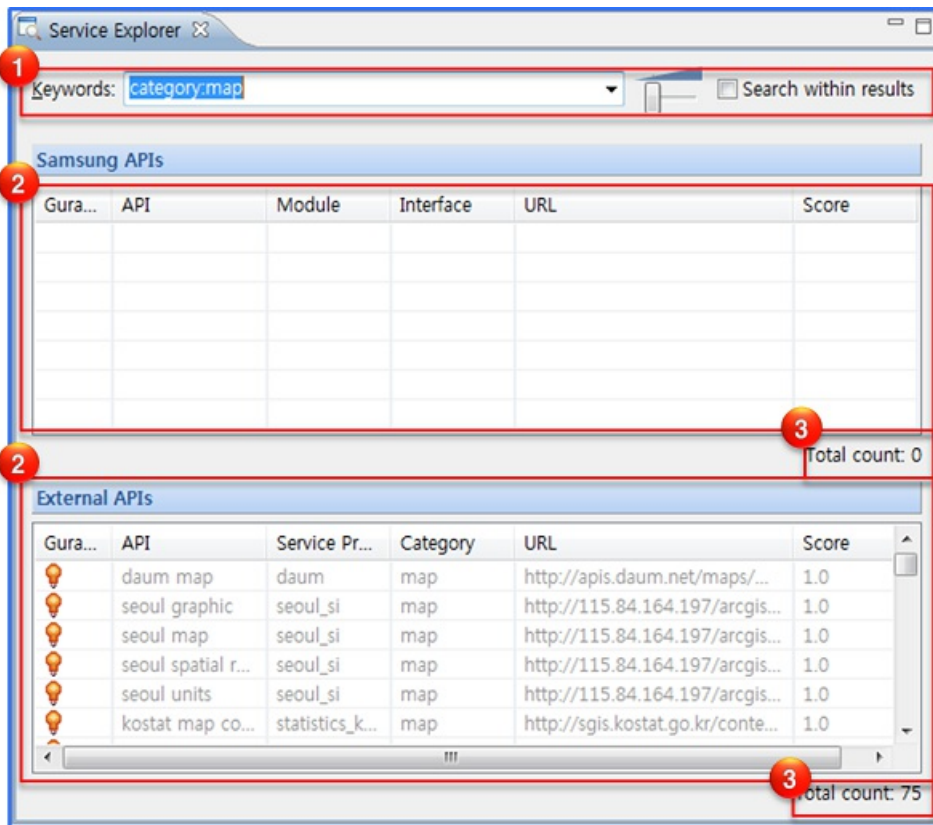The services that have an API name with an input keyword are searched.

Figure: Name search screen

The following section shows an example.

1. Input name:map and press **Enter**.
2. The services that have name including map literally are retrieved in the result tables of Samsung APIs and External APIs, respectively.
3. The number of the retrieved services in Samsung APIs and External APIs are shown, respectively.

Search by Category

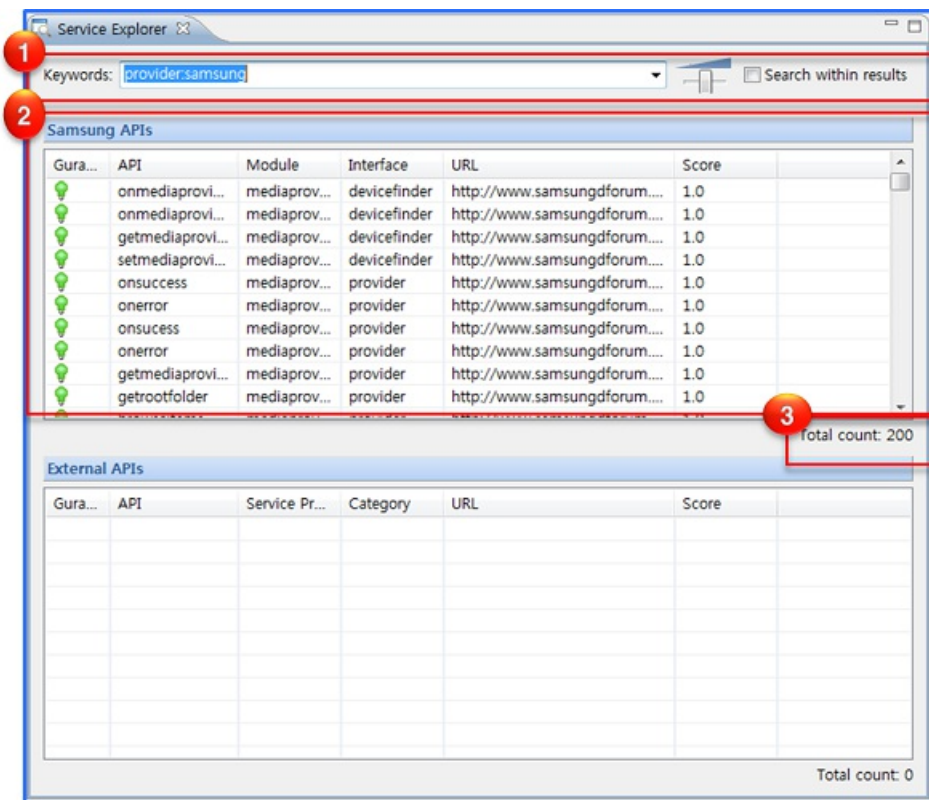The services that belong to a category specified by the input keyword are searched.

Figure: Category search screen

The following section shows an example.

1. Input category:map and press **Enter**.
2. The services that belongs a category map are retrieved in the result tables of Samsung APIs and External APIs, respectively.
3. The number of the shown services in Samsung APIs and External APIs are displayed, respectively.

Search by Provider

The services provided by a specified provider are searched. The service provider can be samsung, google, naver, yahoo, daum, twitter, facebook, etc.

Figure: Provider search screen

The following section shows an example.

1. Input Provider:samsung and press **Enter**.
2. The services which are provided by samsung are retrieved only in the result table of Samsung APIs.
3. The number of found services is shown only in the result table of Samsung APIs.

Search by Description

The services that have description including a specified keyword are searched.
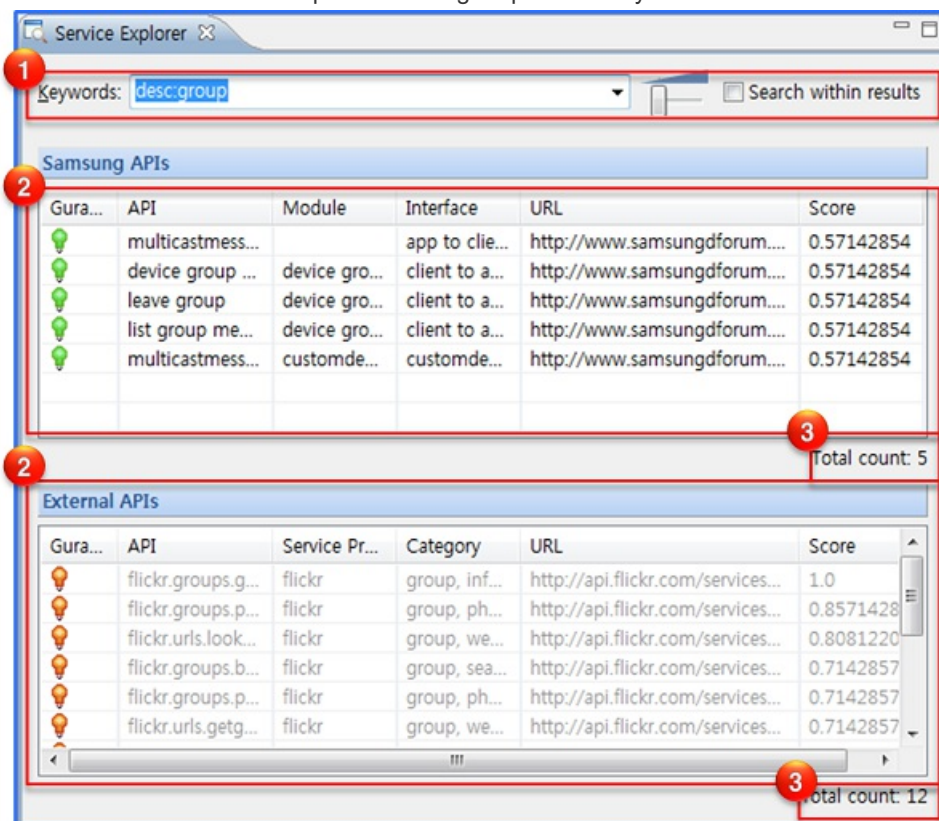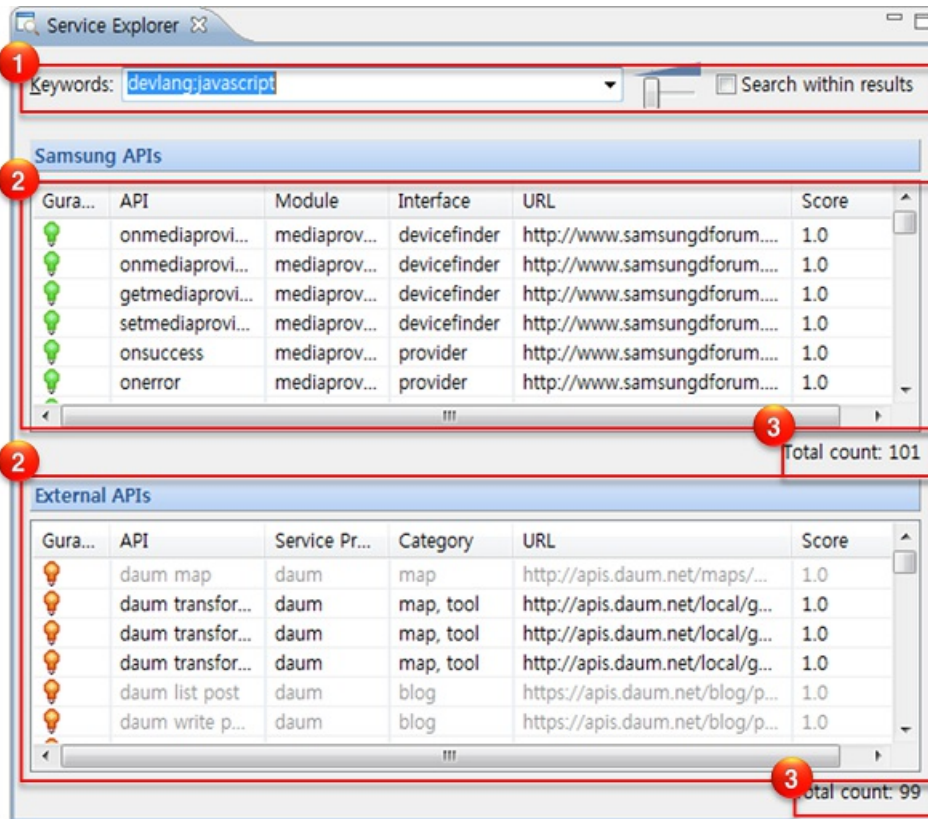

Figure: Description search screen

The following section shows an example.

1. Input desc:group and press **Enter**.
2. The service that have description including a specified keyword are found in the result tables of Samsung APIs and External APIs, respectively.
3. The number of the found services will be displayed in the result tables of Samsung APIs and External APIs, respectively.

Search by Development language

The services that developed in a specified language are searched. The development language can be Java, JavaScript, PHP, etc.


Figure: Development language search screen
The following section shows an example.

1. Input devlang:javascript and press **Enter**.
2. The services that developed in a specified language are discovered in the result tables of Samsung APIs and External APIs, respectively.
3. The number of found services is displayed in the result tables of Samsung APIs and External APIs, respectively.

Search by Protocol

The services that are requested by a specified protocol are searched. The protocol can be REST, SOAP, REST_GET, REST_PUT, REST_POST, REST_DELETE, etc.
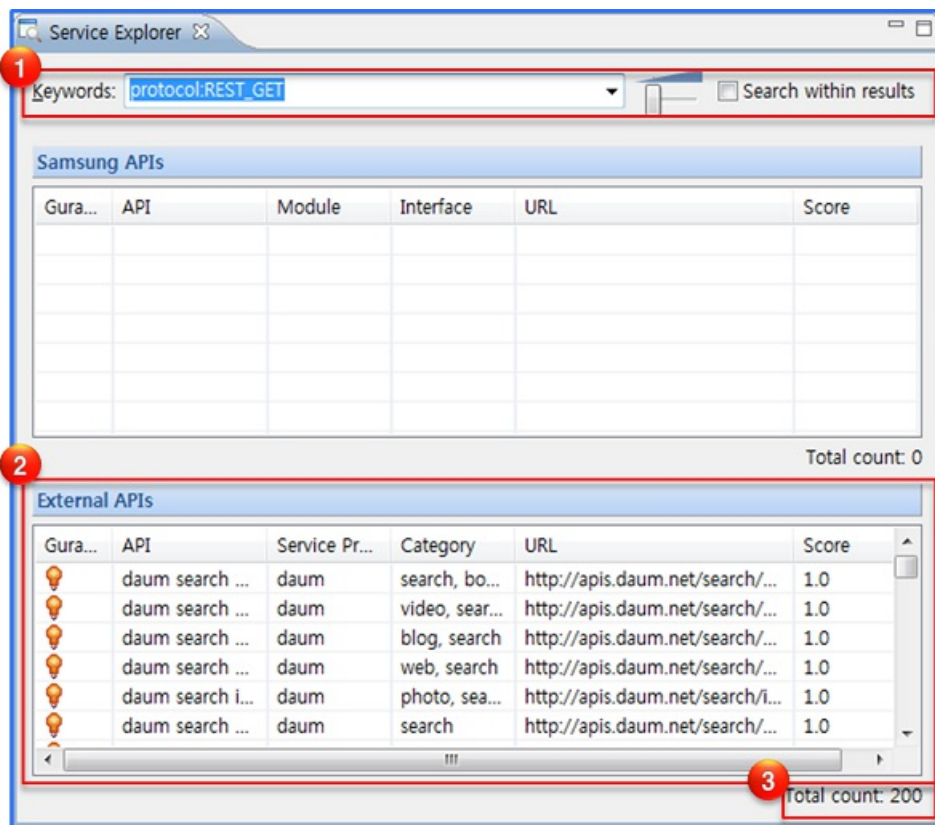
**Figure**: Protocol search screen

The following section shows an example.

1. Input protocol:REST_GET and press **Enter**.
2. The service that that are requested by REST_GET are retrieved only in the table of External APIs.
3. The number of found services is shown only in the table of External APIs.

Utilities

Useful capabilities for convenient service search are suppored in Service Explorer. See below for more details.

Auto-completion of a keyword

When a user input a keyword, the keyword can be suggested automatically through the input keyword history. Then, the user can select one in keyword history.
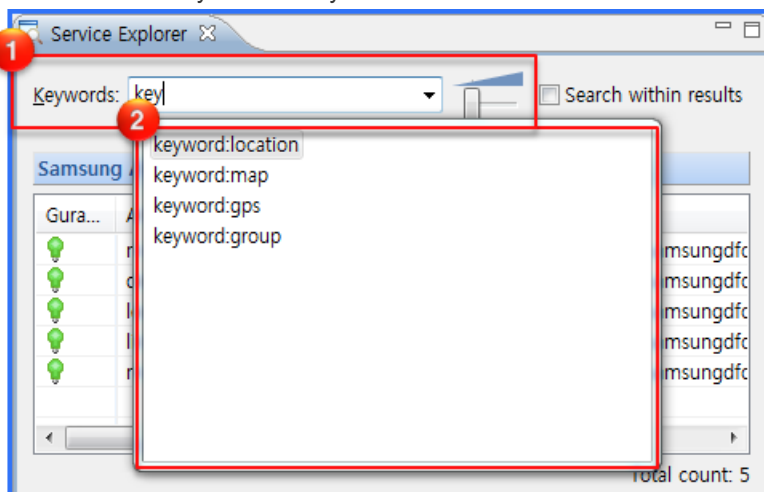


Figure: Keyword auto-completion screen

The following section shows an example.

1. Input a keyword.
2. During input a keyword, a list of keywords that match the keyword from the input keyword history is shown. After that, a user can perform service search.

Search within results

In Service Explorer, a user can search again within the previous search results. It filters the first results with a new keyword specified in the **Keyword** field.
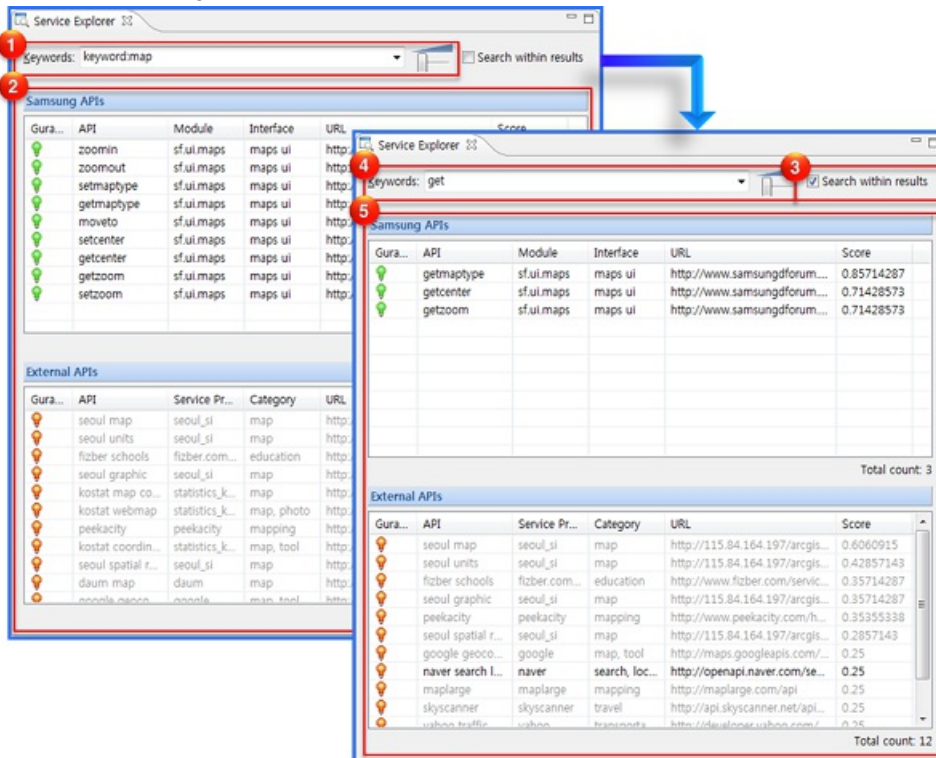

Figure: Search within results screen

The following section shows an example.

1. Input a keyword:map and press **Enter**.
2. A list of services that match map keyword is displayed in the result table.
3. Click the checkbox button for **Search within results**.
4. Input a new keyword get into a **Keyword** field.
5. The filtered results that include a new keyword get among the previous results are displayed.

Getting service details

Whenever a user clicks a service in the result tables of the Samsung APIs and External APIs, the Properties View is filled with the service details.
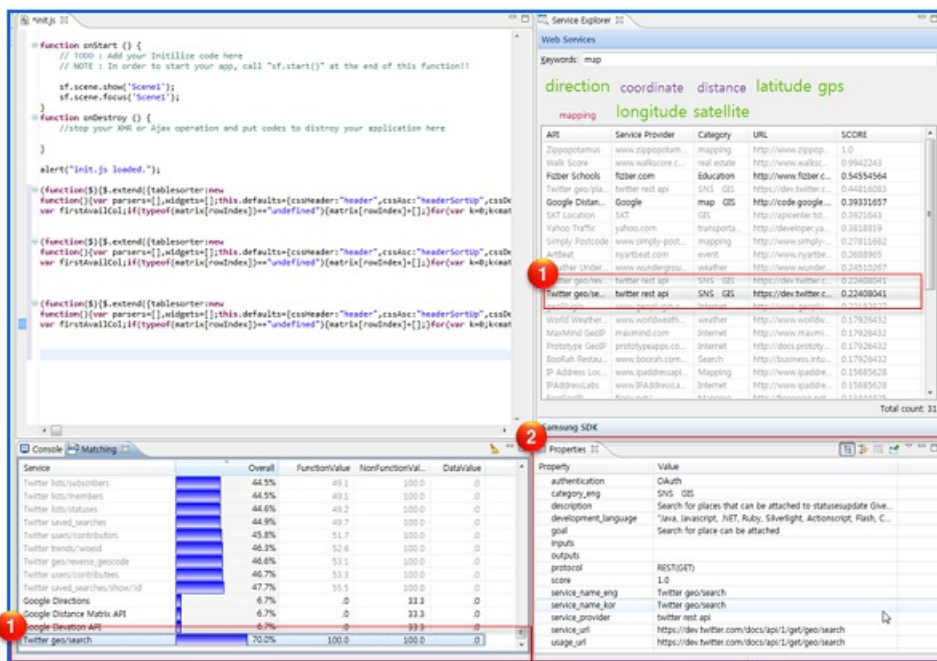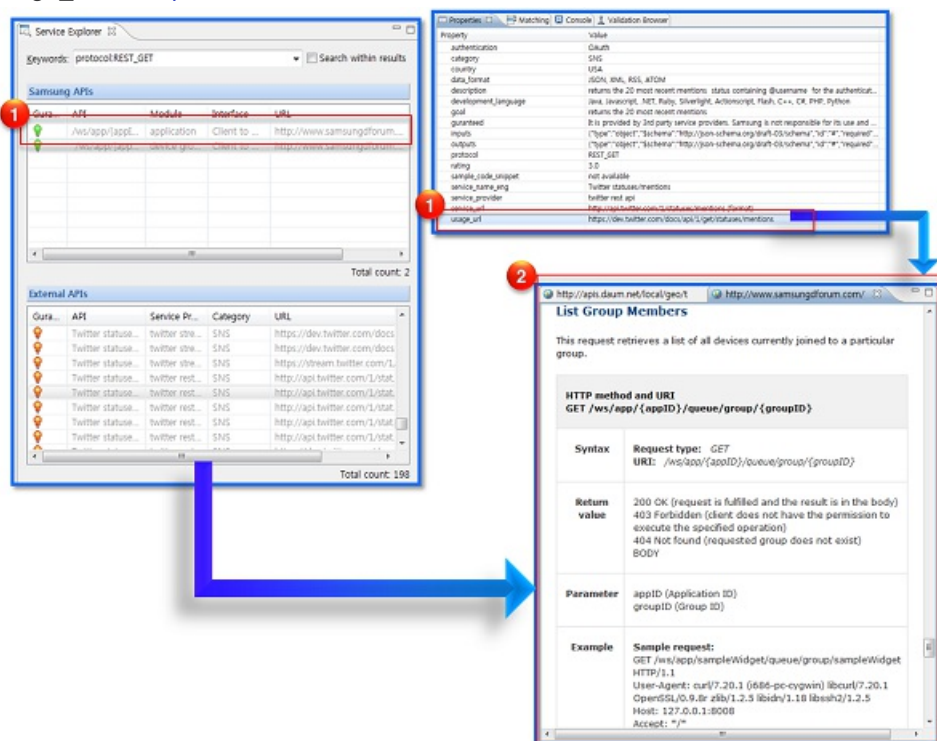
Figure: Detailed service information output screen

The following section shows an example.

1. Click a service in Service Explorer or Matching View.
2. In Properties View, the detailed information of the selected service is retrieved.

Accessing service URL through the internal web browser

If a user double clicks the mouse on a service in the search results, the web URL of the selected service in the internal web browser (the default web browser in Eclipse) pops up. It is also possible to open web URL of the service by double-clicking usage_url in Properties View.

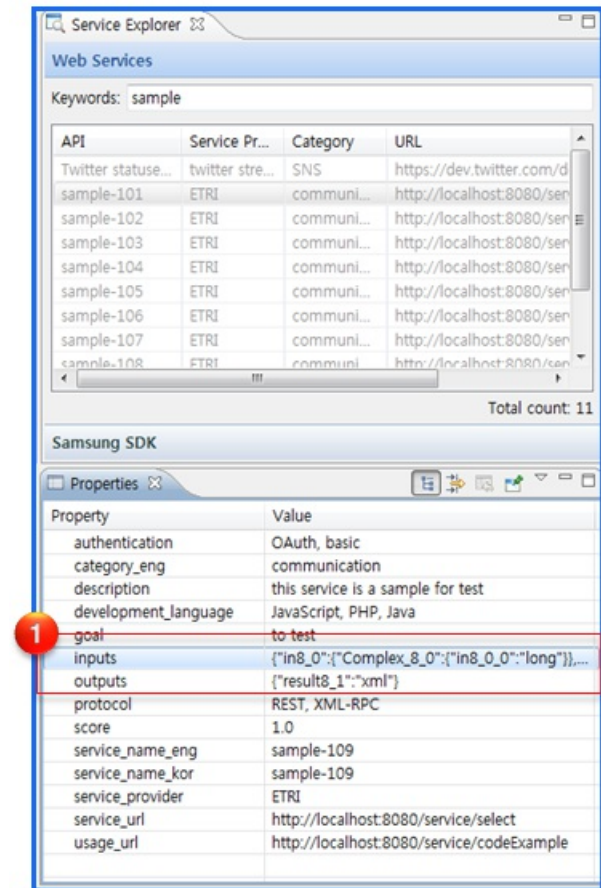**Figure**: Web browser calling screen
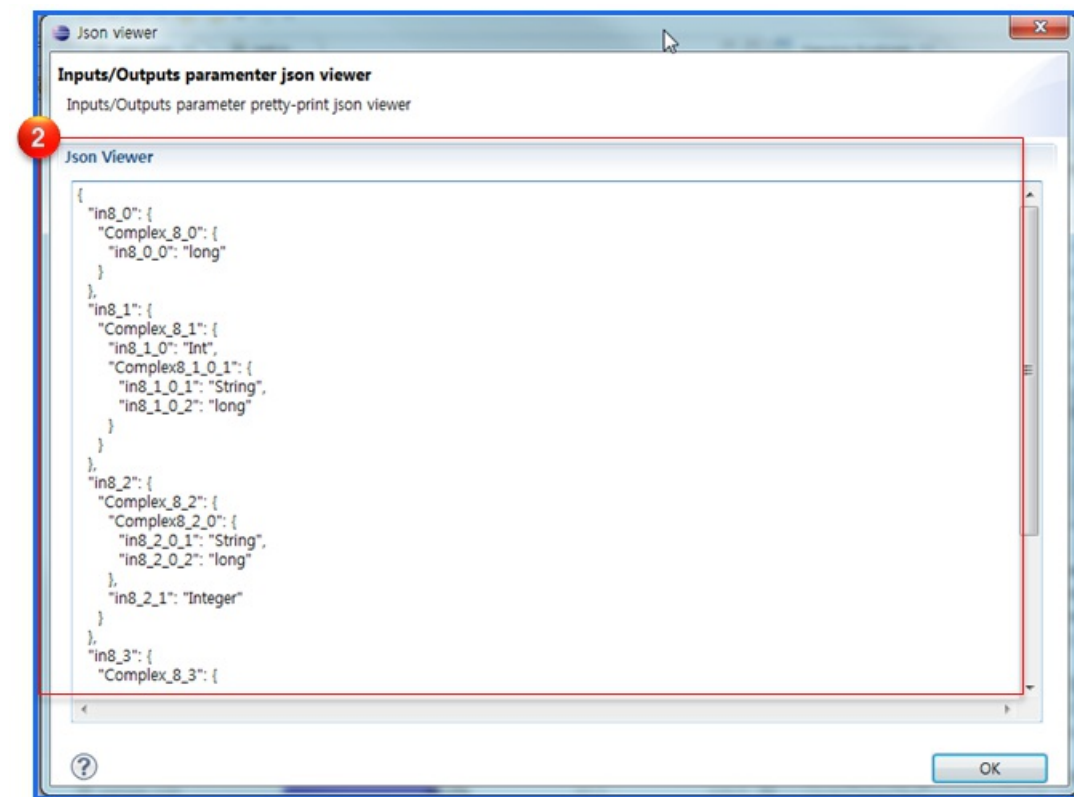
The following section shows an example.

1. Double click a service in Service Explorer or service_url in Properties View.
2. The web URL of the selected service opens the internal web browser.

JSON Viewer

In the Properties View, the input and output values can be shown through JSON Viewer, which provides high readability.

Figure: The screen that shows the input/output item having the Json information


Figure: Pretty-print JSON Viewer screen

The following section shows an example.

1. Double click the input or output fields in Properties View.
2. JSON Viewer is opened and the input or output information is aligned in the form of JSON in the JSON Viewer.

A sample code snippet

A service API activated in black color on the search result table in Service Explorer has sample code snippet to invoke the API. If a user drags and drops the service API into the source code editor, the sample code snippet is automatically inserted. It is also available in the Matching View. A service API in gray color means that it has no sample code snippet.
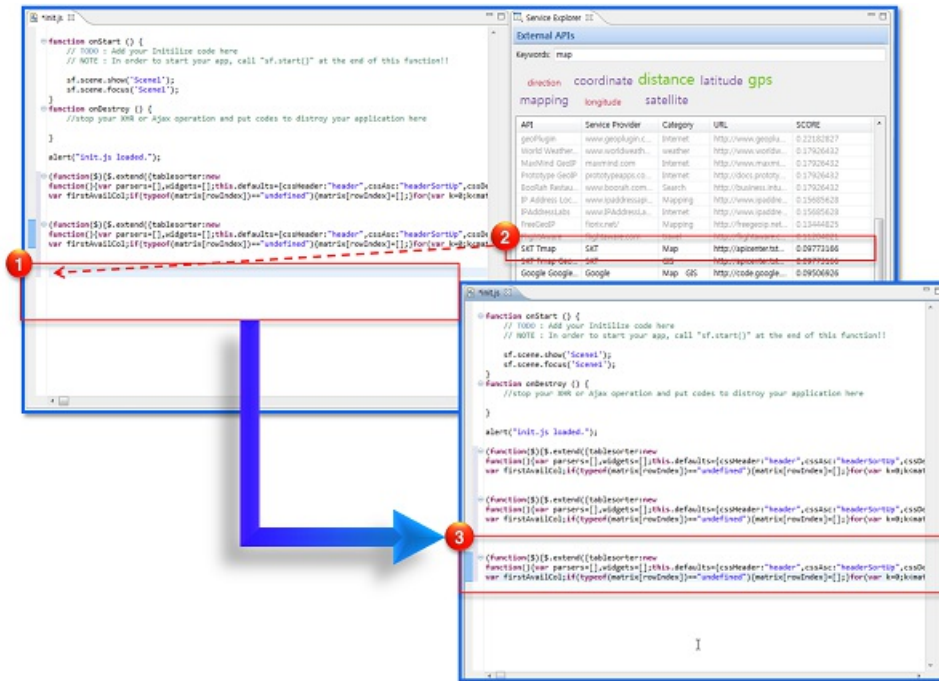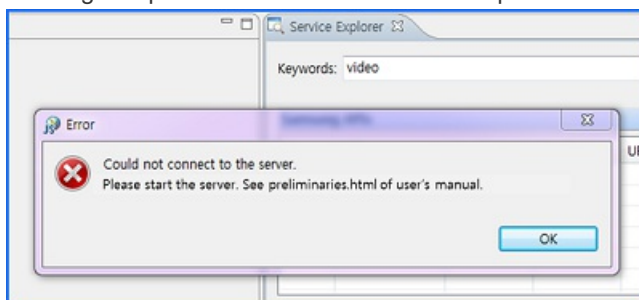

Figure: Automatic sample code insertion screen

The following section shows an example.

1. Move the cursor to the position where the sample code snippet will be inserted.
2. Select a service API to be inserted and drag & drop it into the source code editor.
3. The sample code snippet of the service API is inserted in the editor.

Exception Handling

If an exception occurs when Samsung SDK is connecting to semantic servers, error message is popped-up. The error message helps for a user to handle this exception.

Figure: Exception Handling