

## 1. Register Hub User by Public Key

|                    |            |  |   |                     |
|--------------------|------------|--|---|---------------------|
| Function name      |            | registerHub(String id, String publicKey, CryptoType cryptoType)  |   |                     |
| Description        |            | Register by Public key. This function allows users define the ID by themselves. If successful, returns the user's ID in the Hub. |   |                     |
| Request Parameters |            |  |   |                     |
| No.                | Parameter  | Type   | Required  | Description         |
| 1                  | id         | String   | N   | Self-defined hub ID |
| 2                  | publicKey  | String   | Y   | Public key          |
| 3                  | CryptoType | String   | Y   | ECDSA               |
| Response parameter |            |  |   |                     |
| No.                | Parameter  | Type   | Required  | Description         |
| 1                  |            | RegisterHubResult  | Y   | Registration result |
| RegisterHubResult  |            |  |   |                     |
| No.                | Parameter  | Type   | Required  |                     |
| 1                  | success    | Boolean  | Return true if success, return false if failure |                     |
| 2                  | uid        | String   | ID in the Hub                                   |                     |
| 3                  | message    | String   | Result description                              |                     |

## 2. Save Resource

|                     |  |              |          |  |
|---------------------|--|--------------|----------|--|
| Function name       | saveResource(SaveResource saveResource)  |              |          |  |
| Description         | Store the resource to the Hub. If the user stores it himself, the uid and the ownerId should be the same. At this time, there is no create permission need and can call directly; if the issuer stores it for the user after issuing the credentials, the uid should be the issuer, and the ownerId should be the user. At this time, the user must have created WRITE permission for it, otherwise the storage will fail. |              |          |  |
| Request Parameters  |  |              |          |  |
| No.                 | Parameter  | Type         | Required | Description  |
| 1                   |  | SaveResource | Y        |  |
| SaveResource        |  |              |          |  |
| 1                   | did  | String       | Y        | ID in the Hub  |
| 2                   | content  | String       | Y        | Resource content   |
| 3                   | url  | String       | N        | The path of the stored resource. Null when stored by the user; required when stored by the issuer. |
| 4                   | ownerUid   | String       | Y        | Resource owner’s ID in the Hub   |
| 5                   | grant  | Operation    | Y        | Operation permissions: WRITE/UPDATE  |
| 6                   | privateKey   | String       | Y        | Private key  |
| Response Parameters |  |              |          |  |

| No.                       | Parameter  | Type               | Required | Description                      |
|---------------------------|------------|--------------------|----------|----------------------------------|
| 1                         |            | SaveResourceResult | Y        | Save result                      |
| <b>SaveResourceResult</b> |            |                    |          |                                  |
| No.                       | Parameter  | Type               | Required | Description                      |
| 1                         | url        | String             | Y        | The path of the stored resource. |
| 2                         | encryptKey | String             | Y        | Ciphertext key                   |

### 3. Get Resource

|                     |  |                   |          |                                  |
|---------------------|--|-------------------|----------|----------------------------------|
| Function name       | getResource(String did,String privateKey, String url)  |                   |          |                                  |
| Description         | Access the Hub and read the specified resource. Users can directly access, third parties need to obtain authorization from the user to access. |                   |          |                                  |
| Request Parameters  |  |                   |          |                                  |
| No.                 | Parameter  | Type              | Required | Description                      |
| 1                   | uid  | String            | Y        | ID in the Hub                    |
| 2                   | privateKey   | String            | Y        | Private key                      |
| 3                   | url  | String            | Y        | The path of the stored resource. |
| Response Parameters |  |                   |          |                                  |
| No.                 | Parameter  | Type              | Required | Description                      |
| 1                   |  | QueryResourceResp | Y        | Query result                     |
| QueryResourceResp   |  |                   |          |                                  |
| No.                 | Parameter  | Type              | Required | Description                      |
| 1                   | content  | String            | Y        | Ciphertext resource content      |
| 2                   | key  | String            | Y        | Ciphertext key                   |

### 4. Delete Resource

|                     |  |         |          |   |
|---------------------|--|---------|----------|---|
| Function name       | deleteResource(String did,String privateKey, String url)                           |         |          |   |
| Description         | The resource owner can call this function to delete a certain resource in the Hub. |         |          |   |
| Request Parameters  |  |         |          |   |
| No.                 | Parameter  | Type    | Required | Description                                     |
| 1                   | uid  | String  | Y        | ID in the Hub                                   |
| 2                   | privateKey   | String  | Y        | Private key                                     |
| 3                   | url  | String  | Y        | The path of the stored resource.                |
| Response Parameters |  |         |          |   |
| No.                 | Parameter  | Type    | Required | Description                                     |
| 1                   |  | Boolean | Y        | Return true if success, return false if failure |

## 5. Create Permissions

|                      |  |                      |          |  |
|----------------------|--|----------------------|----------|--|
| Function name        | createPermission(CreatePermission createPermission)  |                      |          |  |
| Description          | Resource owner creates the permissions of accessing to the resource in the Hub for third parties. Permissions WRITE means store resource, UPDATE means update resource, READ means read resource. An authorization can only be accessed once, and an authorization with the same uid and the same permission cannot be created again without access. However, the permissions of UPDATE and READ from the server side will return the same result for each call. |                      |          |  |
| Request Parameters   |  |                      |          |  |
| No.                  | Parameter  | Type                 | Required | Description  |
| 1                    |  | CreatePermission     | Y        |  |
| CreatePermission     |  |                      |          |  |
| 1                    | uid  | String               | Y        | ID in the Hub  |
| 2                    | url  | String               | N        | The path of the stored resource. Can be null if the permission is WRITE, required when the permission is READ/UPDATE |
| 3                    | grant  | Operation            | Y        | Operation permissions: WRITE/UPDATE/READ   |
| 4                    | grantUid   | String               | Y        | Authorized ID in the Hub   |
| 5                    | grantPublicKey   | String               | Y        | Authorized public key  |
| 6                    | privateKey   | String               | Y        | Private key  |
| Response Parameters  |  |                      |          |  |
| No.                  | Parameter  | Type                 | Required | Description  |
| 1                    |  | CreatePermissionResp | Y        | Creation result  |
| CreatePermissionResp |  |                      |          |  |
| No.                  | Parameter  | Type                 | Required | Description  |
| 1                    | url  | String               | Y        | The path of the stored resource.   |
| 2                    | key  | String               | Y        | Ciphertext key   |

## 6. Delete Permissions

|                    |  |                  |          |                                  |
|--------------------|--|------------------|----------|----------------------------------|
| Function name      | deletePermission(DeletePermission deletePermission)  |                  |          |                                  |
| Description        | Resource owner calls this function to delete permissions that are not yet accessed by a third party. |                  |          |                                  |
| Request Parameters |  |                  |          |                                  |
| No.                | Parameter  | Type             | Required | Description                      |
| 1                  |  | DeletePermission | Y        |                                  |
| DeletePermission   |  |                  |          |                                  |
| 1                  | uid  | String           | Y        | ID in the Hub                    |
| 2                  | url  | String           | Y        | The path of the stored resource. |

| 3                           | grantUid   | String               | Y        | Authorized ID in the Hub                        |
|-----------------------------|------------|----------------------|----------|---|
| 4                           | grant      | Operation            | Y        | Operation permissions: WRITE/UPDATE/READ        |
| 5                           | privateKey | String               | Y        | Private key                                     |
| <b>Response Parameters</b>  |            |                      |          |   |
| No.                         | Parameter  | Type                 | Required | Description                                     |
| 1                           |            | DeletePermissionResp | Y        | Deletion result                                 |
| <b>DeletePermissionResp</b> |            |                      |          |   |
| No.                         | Parameter  | Type                 | Required | Description                                     |
| 1                           | success    | Boolean              | Y        | Return true if success, return false if failure |
| 2                           | message    | String               | Y        | Result description                              |

## 7. Query Permissions

|                     |  |                      |          |  |
|---------------------|--|----------------------|----------|--|
| Function name       | queryPermission(QueryPermission queryPermission)                                   |                      |          |  |
| Description         | Resource owner can call this function to query Permissions that have been created. |                      |          |  |
| Request Parameters  |  |                      |          |  |
| No.                 | Parameter  | Type                 | Required | Description                                  |
| 1                   |  | QueryPermission      | Y        |  |
| QueryPermission     |  |                      |          |  |
| 1                   | uid  | String               | Y        | ID in the Hub                                |
| 2                   | grantUid   | String               | N        | Authorized ID in the Hub                     |
| 3                   | flag   | UsedFlag             | N        | Access flag. YES: accessed; NO: Not accessed |
| 4                   | privateKey   | String               | Y        | Private key                                  |
| Response Parameters |  |                      |          |  |
| No.                 | Parameter  | Type                 | Required | Description                                  |
| 1                   |  | List<PermissionInfo> | Y        | Query result, list of Permissions            |
| PermissionInfo      |  |                      |          |  |
| 1                   | uid  | String               | Y        | ID in the Hub                                |
| 2                   | grantUid   | String               | Y        | Authorized ID in the Hub                     |
| 3                   | url  | String               | Y        | The path of the stored resource.             |
| 4                   | grant  | String               | Y        | Operation permissions:                       |

|    |            |               |   |  |
|----|------------|---------------|---|--|
|    |            |               |   | WRITE/UPDATE/<br>READ                              |
| 5  | createTime | LocalDateTime | Y | Authorization<br>created time                      |
| 6  | readTime   | LocalDateTime | N | Authorization used<br>time                         |
| 7  | flag       | UsedFlag      | Y | Access flag. YES:<br>accessed; NO: Not<br>accessed |
| 8  | status     | Integer       | Y | Delete flag. 0:<br>Deleted; 1: Not<br>deleted      |
| 9  | key        | String        | N | Ciphertext key                                     |
| 10 | ownerKey   | String        | N | Owner's key  |

## 8. Query Granted Permissions

|                        |  |                           |          |  |
|------------------------|--|---------------------------|----------|--|
| Function name          | queryGrantedPermission(QueryGrantedPermission queryPermission)   |                           |          |  |
| Description            | Users can look up all or part of the permission records authorized to them in three dimensions: the uid of the resource owner, whether it has been accessed and the permission type. |                           |          |  |
| Request Parameters     |  |                           |          |  |
| No.                    | Parameter  | Type                      | Required | Description                                  |
| 1                      |  | QueryGrantedPermission    | Y        |  |
| QueryGrantedPermission |  |                           |          |  |
| 1                      | uid  | String                    | Y        | ID in the Hub                                |
| 2                      | grantUid   | String                    | N        | Resource owner’s ID in the Hub               |
| 3                      | grant  | Operation                 | N        | Operation permissions: WRITE/UPDATE/READ     |
| 4                      | flag   | UsedFlag                  | N        | Access flag. YES: accessed; NO: Not accessed |
| 5                      | privateKey   | String                    | Y        | Private key                                  |
| Response Parameters    |  |                           |          |  |
| No.                    | Parameter  | Type                      | Required | Description                                  |
| 1                      |  | List<GrantPermissionInfo> | Y        | Query result, list of Permissions            |
| GrantPermissionInfo    |  |                           |          |  |
| 1                      | url  | String                    | Y        | The path of the stored resource.             |
| 2                      | grant  | String                    | Y        | Operation permissions: WRITE/UPDATE/READ     |
| 3                      | status   | Integer                   | Y        | Delete flag. 0: Deleted; 1: Not deleted      |
| 4                      | createTime   | LocalDateTime             | Y        | Authorization created time                   |
| 5                      | readTime   | LocalDateTime             | N        | Authorization used time                      |
| 6                      | flag   | UsedFlag                  | Y        | Access flag. YES: accessed; NO: Not          |

|   |          |        |   |                                |
|---|----------|--------|---|--------------------------------|
|   |          |        |   | accessed                       |
| 7 | ownerUid | String | Y | Resource owner's ID in the Hub |
| 8 | key      | String | N | Ciphertext key                 |
| 9 | ownerKey | String | N | Owner's key                    |

## 9. Query Resource Operation Record

|                      |               |   |          |  |
|----------------------|---------------|---|----------|--|
| Function name        |               | queryResourceHistory(QueryResourceHistory queryResourceHistory)                   |          |  |
| Description          |               | Resource owner calls this function to query the operation record of the resource. |          |  |
| Request Parameters   |               |   |          |  |
| No.                  | Parameter     | Type  | Required | Description                                |
| 1                    |               | QueryResourceHistory  | Y        |  |
| QueryResourceHistory |               |   |          |  |
| 1                    | uid           | String  | Y        | ID in the Hub                              |
| 2                    | url           | String  | N        | The path of the stored resource.           |
| 3                    | operation     | Operation   | N        | Authorization type:<br>WRITE/UPDATE/DELETE |
| 4                    | privateKey    | String  | Y        | Private key                                |
| Response Parameters  |               |   |          |  |
| No.                  | Parameter     | Type  | Required | Description                                |
| 1                    |               | List<ResourceHistoryInfo>   | Y        | Query result, list of Permissions          |
| ResourceHistoryInfo  |               |   |          |  |
| 1                    | operationUid  | String  | Y        | Operator’s ID in the Hub                   |
| 2                    | ownerUid      | String  | Y        | Owner’s ID in the Hub                      |
| 3                    | operation     | String  | Y        | Operation type:<br>WRITE/UPDATE/READ       |
| 4                    | content       | String  | Y        | Ciphertext resource content                |
| 5                    | url           | String  | Y        | The path of the stored resource.           |
| 6                    | key           | String  | N        | Ciphertext key                             |
| 7                    | operationTime | LocalDateTime   | Y        | Operated time                              |

## 10. Change Resource Owner

|                    |           |  |          |                        |
|--------------------|-----------|--|----------|------------------------|
| Function name      |           | transferOwner(TransferOwner transferOwner) |          |                        |
| Description        |           | Change the resource owner in the Hub.      |          |                        |
| Request Parameters |           |  |          |                        |
| No.                | Parameter | Type                                       | Required | Description            |
| 1                  |           | TransferOwner                              | Y        |                        |
| TransferOwner      |           |  |          |                        |
| 1                  | uid       | String                                     | Y        | ID in the Hub          |
| 2                  | url       | String                                     | Y        | The path of the stored |

|                     |                   |         |          | resource.                                       |
|---------------------|-------------------|---------|----------|---|
| 3                   | newOwnerUid       | String  | Y        | New owner's ID in the Hub                       |
| 4                   | newOwnerPublicKey | String  | Y        | New owner's public key                          |
| 5                   | privateKey        | String  | Y        | Private key                                     |
| Response Parameters |                   |         |          |   |
| No.                 | Parameter         | Type    | Required | Description                                     |
| 1                   |                   | Boolean | Y        | Return true if success, return false if failure |

## 11. Decrypt Resource

|                            |            |  |          |                             |
|----------------------------|------------|--|----------|-----------------------------|
| <b>Function name</b>       |            | decrypt(String content, String encptyKey, String privateKey)   |          |                             |
| <b>Description</b>         |            | Decrypt the ciphertext resource content returned from the Get Resource interface using the ciphertext key returned from the Get Resource interface to get the plaintext resource content |          |                             |
| <b>Request Parameters</b>  |            |  |          |                             |
| No.                        | Parameter  | Type   | Required | Description                 |
| 1                          | content    | String   | Y        | Ciphertext resource content |
| 2                          | encptyKey  | String   | Y        | Ciphertext key              |
| 3                          | privateKey | String   | Y        | Private key                 |
| <b>Response Parameters</b> |            |  |          |                             |
| No.                        | Parameter  | Type   | Required | Description                 |
| 1                          |            | String   | Y        | Plaintext resource content  |