

软件成分分析子系统-geekloud工具手册

简介

这是“知云破晓——云服务软件供应链治理系统”中软件成分分析子系统的工具geekloud。

本工具使用Python语言，请在Linux服务器下构建和使用。

文件结构

```
.
├── build
│   └── interface
│       ├── Analysis-00.toc
│       ├── base_library.zip
│       ├── COLLECT-00.toc
│       ├── EXE-00.toc
│       ├── geekloud
│       ├── geekloud.pkg
│       ├── localpycs
│       ├── PKG-00.toc
│       ├── PYZ-00.pyz
│       ├── PYZ-00.toc
│       ├── warn-interface.txt
│       └── xref-interface.html
└── dist
    └── geekloud
        ├── base_library.zip
        ├── geekloud #可执行文件
        ├── libbz2.so.1.0
        ├── libcrypto.so.3
        ├── lib-dynload
        ├── liblzma.so.5
        ├── libpython3.10.so.1.0
        ├── libssl.so.3
        ├── libz.so.1
        ├── logs #日志
        ├── output #输出
        ├── SBOM #SBOM库
        └── task #组件库
```

运行环境

操作系统：Linux

运行环境：maven, jdk1.8及以上, gradle环境、python环境。

geekloud工具详解

geekloud是“知云破晓”独立开发的面向云服务和Java生态的软件成分分析扫描工具。

功能

该工具用于用户交互的SBOM生成-消费-变换功能如下：

1. SBOM导出：属于SBOM生成功能。生成geekcloud规范的SBOM。
2. SBOM比较：属于SBOM消费功能。也是本系统在对SBOM行业深度调研之后开发的技术，其他软件成分分析工具并不具备比较SBOM功能。本系统的SBOM比较分析功能能够完成对本系统独家geekcloud规范、主流规范CycloneDX和SPDX三种规范的互相比对，比较的指标包括：共同的组件、独有的组件、共同的组件间依赖关系、独有的组件间依赖关系。并且比较范围精细，组件间的比较细化到version、scope等信息。
3. SBOM转换：属于SBOM变换功能。支持geekcloud规范和CycloneDX、SPDX三种规范之间的两两相互转换。

运行环境

将geekcloud目录整个放在Linux操作系统上。如上述要求安装好Java、Maven、Gradle环境。

命令详解

切入到./dist/geekcloud/目录下, 其中文件 `geekcloud` 为ELF文件，是Linux系统下的可执行文件，亦即本系统的用户交互工具。其他文件为改可执行文件运行所需库等。

参数说明手册

用户可以在终端键入 `./geekcloud --h` 来查看指令参数手册：

```
usage: geekcloud [-h] [--action ACTION] [--taskid TASKID] [--depth DEPTH] [--verbose] [--srcType SRCTYPE]
                [--tarType TARTYPE] [--srcSBOM SRCSBOM] [--tarSBOM TARSBOM] [--output OUTPUT]

options:
  -h, --help            show this help message and exit
  --action ACTION        do something
  --taskid TASKID        taskid
  --depth DEPTH          max dependency depth
  --verbose              whether output for 'nodes-links' format?
  --srcType SRCTYPE      the src SBOM file
  --tarType TARTYPE      the compared SBOM file
  --srcSBOM SRCSBOM      the src SBOM file
  --tarSBOM TARSBOM      the compared SBOM file
  --output OUTPUT        the output
```

参数说明/使用详解

--action：执行功能，包括

- dependency (SBOM生成)
- compare (SBOM比较)
- transfer (SBOM转换)

--taskid：用于--action dependency功能，表示被测软件的目录。

--depth：用于--action dependency功能，生成的SBOM format依赖树的层级。

--output：用于所有功能。表示输出文件名，默认为 `output.json`，且存放在运行目录下的 `output` 文件夹下。本工具的输出文件都为json格式。

--srcType：用于transfer和compare功能，表示源SBOM格式，包含 `['cyclonedx', 'spdx', 'geek']`。

--tarType：用于transfer和compare功能，表示目标SBOM格式，包含 `['cyclonedx', 'spdx', 'geek']`。

--srcSBOM：用于transfer和compare功能，表示源SBOM文件。

--tarSBOM：用于compare功能，表示目标比较SBOM文件。

--verbose：用于dependency和transfer功能，表示是否将生成的GeekLoud规范的SBOM转换成另一种易读的格式（geekloud独家定义的简化格式）。

运行命令详解

下面从具体命令行和输出的角度来帮助用户快速开始本工具。

标准输出会说明输出文件和log文件的路径，如下图：

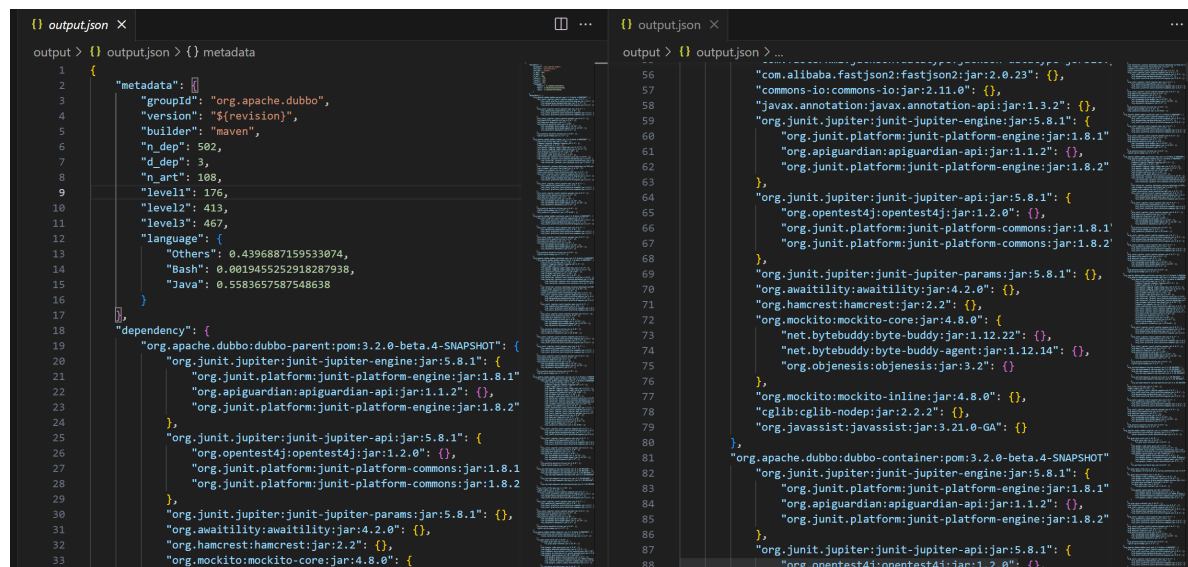
```
(base) root@VM-4-11-ubuntu:~/osschain/dist/geekloud# ./geekloud --action transfer --srcType cyclonedx --tarType ge
ek --srcSBOM ./SBOM/dubbo_cydx.json --output output2.json
log_path /root/osschain/dist/geekloud/logs/error-2023-06-13-14:41:29.log
output_path /root/osschain/dist/geekloud/output/output2.json
[2023-06-13 14:41:29 INFO] Finish
```

SBOM生成

首先将想要测试的组件下载并解压，确保为Maven/Gradle构建的组件。以dubbo为例，首先从github上拉取dubbo到目录./task下（在提交的工具中包含了该目录，用户可以直接使用，也可以放在其他目录下。）

```
./geekloud --action dependency --taskid ./task/dubbo-3.2/
```

得到输出文件依旧在 output 目录下的 output.json 中。格式为GeekLoud的经典格式的SBOM：



```
output > {} outputjson > {} metadata
1  {
2    "metadata": {
3      "groupId": "org.apache.dubbo",
4      "version": "${revision}",
5      "builder": "maven",
6      "n_dep": 502,
7      "d_dep": 3,
8      "n_art": 108,
9      "level1": 176,
10     "level2": 413,
11     "level3": 467,
12     "language": {
13       "Others": 0.4396887159533074,
14       "Bash": 0.0019455252918287938,
15       "Java": 0.5583657587548638
16     }
17   },
18   "dependency": {
19     "org.apache.dubbo:dubbo-parent:pom:3.2.0-beta.4-SNAPSHOT": {
20       "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1": {
21         "org.junit.platform:junit-platform-engine:jar:1.8.1"
22         "org.apiguardian:apiguardian-api:jar:1.1.2": {}
23         "org.junit.platform:junit-platform-engine:jar:1.8.2"
24       },
25       "org.junit.jupiter:junit-jupiter-api:jar:5.8.1": {
26         "org.opentest4j:opentest4j:jar:1.2.0": {}
27         "org.junit.platform:junit-platform-commons:jar:1.8.1"
28         "org.junit.platform:junit-platform-commons:jar:1.8.2"
29       },
30       "org.junit.jupiter:junit-jupiter-params:jar:5.8.1": {},
31       "org.awaitility:awaitility:jar:4.2.0": {},
32       "org.hamcrest:hamcrest:jar:2.2": {},
33       "org.mockito:mockito-core:jar:4.8.0": {
34         "com.alibaba.fastjson2:fastjson2:jar:2.0.23": {},
35         "commons-io:commons-io:jar:2.11.0": {},
36         "javax.annotation:javax.annotation-api:jar:1.3.2": {},
37         "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1": {
38           "org.junit.platform:junit-platform-engine:jar:1.8.1"
39           "org.apiguardian:apiguardian-api:jar:1.1.2": {}
40           "org.junit.platform:junit-platform-engine:jar:1.8.2"
41         },
42         "org.junit.jupiter:junit-jupiter-api:jar:5.8.1": {
43           "org.opentest4j:opentest4j:jar:1.2.0": {}
44           "org.junit.platform:junit-platform-commons:jar:1.8.1"
45           "org.junit.platform:junit-platform-commons:jar:1.8.2"
46         },
47         "org.junit.jupiter:junit-jupiter-params:jar:5.8.1": {},
48         "org.awaitility:awaitility:jar:4.2.0": {},
49         "org.hamcrest:hamcrest:jar:2.2": {},
50         "org.mockito:mockito-core:jar:4.8.0": {
51           "net.bytebuddy:byte-buddy:jar:1.12.22": {},
52           "net.bytebuddy:byte-buddy-agent:jar:1.12.14": {},
53           "org.objenesis:objenesis:jar:3.2": {}
54         },
55         "org.mockito:mockito-inline:jar:4.8.0": {},
56         "cglib:cglib-nodep:jar:2.2.2": {},
57         "org.javassist:javassist:jar:3.21.0-GA": {}
58       },
59       "org.apache.dubbo:dubbo-container:pom:3.2.0-beta.4-SNAPSHOT"
60     },
61     "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1": {
62       "org.junit.platform:junit-platform-engine:jar:1.8.1"
63       "org.apiguardian:apiguardian-api:jar:1.1.2": {}
64       "org.junit.platform:junit-platform-engine:jar:1.8.2"
65     },
66     "org.opentest4j:opentest4j:jar:1.2.0": {},
67     "org.junit.platform:junit-platform-commons:jar:1.8.1"
68     "org.junit.platform:junit-platform-commons:jar:1.8.2"
69     "org.junit.jupiter:junit-jupiter-api:jar:5.8.1": {
70       "org.opentest4j:opentest4j:jar:1.2.0": {}
71     },
72     "org.awaitility:awaitility:jar:4.2.0": {},
73     "org.hamcrest:hamcrest:jar:2.2": {},
74     "org.mockito:mockito-core:jar:4.8.0": {
75       "net.bytebuddy:byte-buddy:jar:1.12.22": {},
76       "net.bytebuddy:byte-buddy-agent:jar:1.12.14": {},
77       "org.objenesis:objenesis:jar:3.2": {}
78     },
79     "org.mockito:mockito-inline:jar:4.8.0": {},
80     "cglib:cglib-nodep:jar:2.2.2": {},
81     "org.javassist:javassist:jar:3.21.0-GA": {}
82   },
83   "org.apache.dubbo:dubbo-container:pom:3.2.0-beta.4-SNAPSHOT"
84   "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1": {
85     "org.junit.platform:junit-platform-engine:jar:1.8.1"
86     "org.apiguardian:apiguardian-api:jar:1.1.2": {}
87     "org.junit.platform:junit-platform-engine:jar:1.8.2"
88   },
89   "org.opentest4j:opentest4j:jar:1.2.0": {},
90   "org.junit.platform:junit-platform-commons:jar:1.8.1"
91   "org.junit.platform:junit-platform-commons:jar:1.8.2"
92   "org.junit.jupiter:junit-jupiter-api:jar:5.8.1": {
93     "org.opentest4j:opentest4j:jar:1.2.0": {}
94   },
95   "org.awaitility:awaitility:jar:4.2.0": {},
96   "org.hamcrest:hamcrest:jar:2.2": {},
97   "org.mockito:mockito-core:jar:4.8.0": {
98     "net.bytebuddy:byte-buddy:jar:1.12.22": {},
99     "net.bytebuddy:byte-buddy-agent:jar:1.12.14": {},
100    "org.objenesis:objenesis:jar:3.2": {}
101  },
102  "org.mockito:mockito-inline:jar:4.8.0": {},
103  "cglib:cglib-nodep:jar:2.2.2": {},
104  "org.javassist:javassist:jar:3.21.0-GA": {}
105}
```

```
./geekloud --action dependency --taskid ./task/dubbo-3.2/ --verbose --output
output2.json
```

得到输出文件在 output 目录下的 output2.json 中: 格式如下：

```
output > {} output2.json > [ ] nodes
1 {
2   "nodes": [
3     {
4       "name": "org.apache.dubbo:dubbo-parent:pom:3.2.0-beta.4-",
5       "shortname": "dubbo-parent",
6       "type": "pom",
7       "version": "3.2.0-beta.4-SNAPSHOT",
8       "maketype": "apache"
9     },
10    {
11      "name": "org.junit.jupiter:junit-jupiter-engine:jar:5.8.",
12      "shortname": "junit-jupiter-engine",
13      "type": "jar",
14      "version": "5.8.1",
15      "maketype": "junit"
16    },
17    {
18      "name": "org.junit.platform:junit-platform-engine:jar:1.",
19      "shortname": "junit-platform-engine",
20      "type": "jar",
21      "version": "1.8.1",
22      "maketype": "junit"
23    },
24    {
25      "name": "org.apiguardian:apiguardian-api:jar:1.1.2",
26      "shortname": "apiguardian-api",
27      "type": "jar",
28      "version": "1.1.2",
29      "maketype": "apiguardian"
30    },
31    {
32      "name": "org.junit.platform:junit-platform-engine:jar:1.",
33      "shortname": "junit-platform-engine",
34      "type": "jar",
35      "version": "1.8.1",
36      "maketype": "junit"
37    }
38  ]
39 }
```

```
output > {} output2.json > [ ] links
40 {
41   "version": "3.2.0-beta.4-SNAPSHOT",
42   "maketype": "apache"
43 },
44 {
45   "links": [
46     {
47       "source": "org.apache.dubbo:dubbo-parent:pom:3.2.0-beta.4-",
48       "target": "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1"
49     },
50     {
51       "source": "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1",
52       "target": "org.junit.platform:junit-platform-engine:jar:1.8.1"
53     },
54     {
55       "source": "org.junit.platform:junit-platform-engine:jar:1.8.1",
56       "target": "org.apiguardian:apiguardian-api:jar:1.1.2"
57     },
58     {
59       "source": "org.junit.jupiter:junit-jupiter-engine:jar:5.8.1",
60       "target": "org.junit.platform:junit-platform-engine:jar:1.8.1"
61     },
62     {
63       "source": "org.apache.dubbo:dubbo-parent:pom:3.2.0-beta.4-",
64       "target": "org.junit.jupiter:junit-jupiter-api:jar:5.8.1"
65     },
66     {
67       "source": "org.junit.jupiter:junit-jupiter-api:jar:5.8.1",
68       "target": "org.opentest4j:opentest4j:jar:1.2.0"
69     },
70     {
71       "source": "org.junit.jupiter:junit-jupiter-api:jar:5.8.1",
72       "target": "org.junit.platform:junit-platform-commons:jar:1.8.1"
73     }
74   ]
75 }
```

SBOM比较

SBOM文件存放在 `./SBOM` 目录下，包含cyclonedx, spdx, geekcloud格式的SBOM，便于用户适用本工具。用户也可以选择自行用其他扫描工具如 `cyclonedx-maven-plugin` 扫描得到对应规范的SBOM，geekcloud格式的SBOM生成参考 [SBOM生成说明](#)。

比较geekcloud和cyclonedx规范的dubbo-2.7.5的SBOM：

```
./geekcloud --action compare --srcType geek --tarType cyclonedx --srcSBOM
./SBOM/dubbo-2.7.5_geek.json --tarSBOM ./SBOM/dubbo-2.7.5_cydx.json
```

输出文件在 `output` 目录下的 `output.json` 中，包含以下指标：

```
dist > geekcloud > output > {} output.json > {} components > [ ] component_samedict > 3
1 {
2   "total_counts": {
3     "component_samedict": 518,
4     "component_diffdict_osschain": 110,
5     "component_diffdict_comparedtools": 2,
6     "dependency_samesrc_sametag": 1039,
7     "dependency_samesrc_diffitag_osschain": 875,
8     "dependency_samesrc_diffitag_comparedtools": 128,
9     "dependency_diffsrc_diffitag_osschain": 337,
10    "dependency_diffsrc_diffitag_comparedtools": 241
11  },
12  "components": {
13    "component_samedict": [
14      "org.apache.commons:commons-pool2:jar:2.9.0",
15      "io.fabric8:kubernetes-client-api:jar:6.1.1",
16      "org.eclipse.jetty:jetty-io:jar:9.4.50.v20221201",
17      "org.apache.dubbo:dubbo-container-spring:jar:3.2.0-beta.4",
18      "org.apache.dubbo:dubbo-rpc-api:jar:3.2.0-beta.4-SNAPSHOT",
19      "org.eclipse.jetty:jetty-io:jar:9.4.38.v20210224",
20      "io.fabric8:kubernetes-model-gatewayapi:jar:6.1.1",
21      "org.apache.dubbo:dubbo-metadata:pom:3.2.0-beta.4-SNAPSHOT",
22      "org.eclipse.jetty:jetty-util-ajax:jar:9.4.38.v20210224",
23      "ch.qos.logback:logback-core:jar:1.1.11",
24      "org.codehaus.jackson:jackson-jaxrs:jar:1.9.13.redhat-000",
25      "org.apache.commons:commons-pool2:jar:2.4.2",
26      "io.netty:netty-codec-socks:jar:4.1.86.Final",
27      "org.codehaus.mojo:animal-sniffer-annotations:jar:1.19",
28      "com.squareup.okhttp3:okhttp:jar:3.12.12",
29      "io.fabric8:zjsonpatch:jar:0.3.0",
30      "org.apache.dubbo:dubbo-spring-boot-compatible:pom:3.2.0-beta.4-SNAPSHOT",
31      "org.apache.dubbo:dubbo-registry-multicast:jar:3.2.0-beta.4-SNAPSHOT",
32      "org.apache.dubbo:dubbo-config:pom:3.2.0-beta.4-SNAPSHOT",
33      "org.apache.dubbo:dubbo-demo-triple:jar:3.2.0-beta.4-SNAPSHOT",
34      "com.alibaba.middleware:metrics-common:jar:2.0.1",
35      "org.slf4j:slf4j-api:jar:1.7.30",
36      "org.codehaus.plexus:plexus-component-annotations:jar:1.7",
37      "io.netty:netty-transport-udt:jar:4.1.72.Final",
38      "org.apache.maven:maven-model-builder:jar:3.5.4",
39      "org.springframework.boot:spring-boot-starter:jar:2.3.1.RC1",
40      "io.netty:netty-handler-proxy:jar:4.1.86.Final",
41      "org.springframework:spring-core:jar:5.3.24",
42      "org.apache.dubbo:dubbo-rpc-injvm:jar:3.2.0-beta.4-SNAPSHOT",
43      "org.apache.dubbo:dubbo-demo-annotation-consumer:jar:3.2.0-beta.4-SNAPSHOT",
44      "org.springframework.boot:spring-boot-starter:jar:2.7.7",
45      "org.springframework:spring-webmvc:jar:5.3.24",
46      "org.springframework:spring-beans:jar:5.3.24",
47      "org.springframework:spring-web:jar:5.3.24",
48      "org.springframework:spring-core:jar:5.3.24",
49      "org.springframework:spring-context:jar:5.3.24",
50      "io.grpc:grpc-stub:jar:1.41.0",
51      "com.google.guava:guava:jar:30.1-android",
52      "io.grpc:grpc-api:jar:1.41.0",
53      "com.google.inject:guice:jar:no_aop:4.2.0",
54      "com.google.guava:guava:jar:20.0",
55      "javax.inject:javax.inject:jar:1",
56      "org.springframework:spring-core:jar:5.3.24",
57      "io.netty:netty-codec-http:jar:4.1.72.Final",
58      "io.netty:netty-buffer:jar:4.1.72.Final",
59      "org.apache.dubbo:dubbo-config-center-apollo:jar:3.2.0-beta.4-SNAPSHOT",
60      "io.grpc:grpc-netty:jar:1.41.0",
61      "io.grpc:grpc-core:jar:1.41.0",
62      "org.apache.dubbo:dubbo-remoting-zookeeper:jar:3.2.0-beta.4-SNAPSHOT",
63      "org.apache.dubbo:dubbo-demo-annotation-provider:jar:3.2.0-beta.4-SNAPSHOT",
64      "io.netty:netty-transport-native-epoll:jar:linux-x86_64:4.1.72.Final",
65      "io.netty:netty-buffer:jar:4.1.72.Final",
66      "io.netty:netty-common:jar:4.1.72.Final",
67      "io.netty:netty-transport:jar:4.1.72.Final",
68      "org.springframework.boot:spring-boot-autoconfigure:jar:2.3.1.RC1",
69      "org.apache.dubbo:dubbo-remoting-api:jar:3.2.0-beta.4-SNAPSHOT",
70      "com.squareup.okhttp3:okhttp:jar:3.12.12",
71      "com.google.guava:guava:jar:31.0.1-jre",
72      "io.netty:netty-transport:jar:4.1.72.Final",
73      "com.alibaba.nacos:nacos-client:jar:2.1.2",
74      "org.springframework:spring-core:jar:5.3.24",
75      "org.apache.dubbo:dubbo-rpc-injvm:jar:3.2.0-beta.4-SNAPSHOT",
76      "org.apache.dubbo:dubbo-demo-annotation-consumer:jar:3.2.0-beta.4-SNAPSHOT",
77      "org.springframework.boot:spring-boot-starter:jar:2.7.7",
78      "org.springframework:spring-webmvc:jar:5.3.24",
79      "org.springframework:spring-beans:jar:5.3.24",
80      "org.springframework:spring-web:jar:5.3.24",
81      "org.springframework:spring-core:jar:5.3.24",
82      "org.springframework:spring-context:jar:5.3.24",
83      "io.grpc:grpc-stub:jar:1.41.0",
84      "com.google.guava:guava:jar:30.1-android",
85      "io.grpc:grpc-api:jar:1.41.0",
86      "com.google.inject:guice:jar:no_aop:4.2.0",
87      "com.google.guava:guava:jar:20.0",
88      "javax.inject:javax.inject:jar:1",
89      "org.springframework:spring-core:jar:5.3.24",
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386     "org.springframework:spring-core:jar:5.3.24",
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388     "io.netty:netty-buffer:jar:4.1.72.Final",
389     "org.apache.dubbo:dubbo-config-center-apollo:jar:3.2.0-beta.4-SNAPSHOT",
390     "io.grpc:grpc-netty:jar:1.41.0",
391     "io.grpc:grpc-core:jar:1.41.0",
392     "org.apache.dubbo:dubbo-remoting-zookeeper:jar:3.2.0-beta.4-SNAPSHOT",
393     "org.apache.dubbo:dubbo-demo-annotation-provider:jar:3.2.0-beta.4-SNAPSHOT",
394     "io.netty:netty-transport-native-epoll:jar:linux-x86_64:4.1.72.Final",
395     "io.netty:netty-buffer:jar:4.1.72.Final",
396     "io.netty:netty-common:jar:4.1.72.Final",
397     "io.netty:netty-transport:jar:4.1.72.Final",
398     "org.springframework.boot:spring-boot-autoconfigure:jar:2.3.1.RC1",
399     "org.apache.dubbo:dubbo-remoting-api:jar:3.2.0-beta.4-SNAPSHOT",
400     "com.squareup.okhttp3:okhttp:jar:3.12.12",
401     "com.google.guava:guava:jar:31.0.1-jre",
402     "io.netty:netty-transport:jar:4.1.72.Final",
403     "com.alibaba.nacos:nacos-client:jar:2.1.2",
404     "org.springframework:spring-core:jar:5.3.24",
405     "org.apache.dubbo:dubbo-rpc-injvm:jar:3.2.0-beta.4-SNAPSHOT",
406     "org.apache.dubbo:dubbo-demo-annotation-consumer:jar:3.2.0-beta.4-SNAPSHOT",
407     "org.springframework.boot:spring-boot-starter:jar:2.7.7",
408     "org.springframework:spring-webmvc:jar:5.3.24",
409     "org.springframework:spring-beans:jar:5.3.24",
410     "org.springframework:spring-web:jar:5.3.24",
411     "org.springframework:spring-core:jar:5.3.24",
412     "org.springframework:spring-context:jar:5.3.24",
413     "io.grpc:grpc-stub:jar:1.41.0",
414     "com.google.guava:guava:jar:30.1-android",
415     "io.grpc:grpc-api:jar:1.41.0",
416     "com.google.inject:guice:jar:no_aop:4.2.0",
417     "com.google.guava:guava:jar:20.0",
418     "javax.inject:javax.inject:jar:1",
419     "org.springframework:spring-core:jar:5.3.24",
420     "io.netty:netty-codec-http:jar:4.1.72.Final",
421     "io.netty:netty-buffer:jar:4.1.72.Final",
422     "org.apache.dubbo:dubbo-config-center-apollo:jar:3.2.0-beta.4-SNAPSHOT",
423     "io.grpc:grpc-netty:jar:1.41.0",
424     "io.grpc:grpc-core:jar:1.41.0",
425     "org.apache.dubbo:dubbo-remoting-zookeeper:jar:3.2.0-beta.4-SNAPSHOT",
426     "org.apache.dubbo:dubbo-demo-annotation-provider:jar:3.2.0-beta.4-SNAPSHOT",
427     "io.netty:netty-transport-native-epoll:jar:linux-x86_64:4.1.72.Final",
428     "io.netty:netty-buffer:jar:4.1.72.Final",
429     "io.netty:netty-common:jar:4.1.72.Final",
430     "io.netty:netty-transport:jar:4.1.72.Final",
431     "org.springframework.boot:spring-boot-autoconfigure:jar:2.3.1.RC1",
432     "org.apache.dubbo:dubbo-remoting-api:jar:3.2.0-beta.4-SNAPSHOT",
433     "com.squareup.okhttp3:okhttp:jar:3.12.12",
434     "com.google.guava:guava:jar:31.0.1-jre",
435     "io.netty:netty-transport:jar:4.1.72.Final",
436     "com.alibaba.nacos:nacos-client:jar:2.1.2",
437     "org.springframework:spring-core:jar:5.3.24",
438     "org.apache.dubbo:dubbo-rpc-injvm:jar:3.2.0-beta.4-SNAPSHOT",
439     "org.apache.dubbo:dubbo-demo-annotation-consumer:jar:3.2.0-beta.4-SNAPSHOT",
440     "org.springframework.boot:spring-boot-starter:jar:2.7.7",
441     "org.springframework:spring-webmvc:jar:5.3.24",
442     "org.springframework:spring-beans:jar:5.3.24",
443     "org.springframework:spring-web:jar:5.3.24",
444     "org.springframework:spring-core:jar:5.3.24",
445     "org.springframework:spring-context:jar:5.3.24",
446     "io.grpc:grpc-stub:jar:1.41.0",
447     "com.google.guava:guava:jar:30.1-android",
448     "io.grpc:grpc-api:jar:1.41.0",
449     "com.google.inject:guice:jar:no_aop:4.2.0",
450     "com.google.guava:guava:jar:20.0",
451     "javax.inject:javax.inject:jar:1",
452     "org.springframework:spring-core:jar:5.3.24",
453
```

SBOM转换

源SBOM文件存放在 `./SBOM` 目录下, 包含cyclonedx, spdx, geekcloud格式的SBOM, 便于用户适用本工具。用户也可以选择自行用其他扫描工具如 `cyclonedx-maven-plugin` 扫描得到对应规范的SBOM, geekcloud格式的SBOM生成参考 [SBOM生成说明](#)。

cyclonedx转换为geekcloud经典格式:

```
./geekcloud --action transfer --srcType cyclonedx --tarType geek --srcSBOM
./SBOM/dubbo_cydx.json --output output2.json
```

输出文件在 `output` 目录下的 `output.json` 中。

cyclonedx转换为spdx:

```
./geekcloud --action transfer --srcType cyclonedx --tarType spdx --srcSBOM
./SBOM/dubbo_cydx.json
```

其他转换依此类推。

异常说明

输入文件

1. dependency功能: 请满足输入为对应的组件的目录, 需要为Maven/Gradle构建的, 用户可直接使用task中的例子, 或者 [github](#) 上自行下载。
2. transfer/compare功能: 请满足输入文件为 `dict` 存储形式的json文件, 通常SBOM生成工具都如此输出。

输入命令

本工具针对用户的不同错误输入会给出错误提示信息, 举例如下:

```
⊗ (base) root@VM-4-11-ubuntu:~/osschain/dist/geekcloud# ./geekcloud --action compare --srcType geek --tarType cycloned
x --srcSBOM ./SBOM/dubbo-2.7.5_geek.json --tarSBOM
usage: geekcloud [-h] [--action ACTION] [--taskid TASKID] [--depth DEPTH] [--verbose] [--srcType SRCTYPE]
                [--tarType TARTYPE] [--srcSBOM SRCSBOM] [--tarSBOM TARSBOM] [--output OUTPUT]
geekcloud: error: argument --tarSBOM: expected one argument
```

用户可结合提示信息和命令详解来键入合法的输入。