

1 Il progetto completo

1.1 Docker compose

Verranno analizzate due varianti del docker compose, la prima relativa al progetto, la seconda relativa ad un ambiente reale.

1.1.1 Versione simulata

Questo è il docker compose usato nel progetto, in un ambiente reale una configurazione simile avrebbe poco senso.

```
1 version: "3"
2
3 services:
4   WebServer1:
5     build: Dockerfiles/webserver/.
6     image: webserver
7     container_name: WS1
8     networks:
9       - Internal
10    depends_on:
11      - Syslogserver
12    logging:
13      driver: syslog
14      options:
15        syslog-address: "tcp://localhost:514"
16        tag: "WS1"
17    restart: unless-stopped
18  WebServer2:
19    build: Dockerfiles/webserver/.
20    image: webserver
21    container_name: WS2
22    networks:
23      - Internal
24    depends_on:
25      - Syslogserver
26    logging:
27      driver: syslog
28      options:
29        syslog-address: "tcp://localhost:514"
30        tag: "WS2"
31    restart: unless-stopped
32  WebServer3:
33    build: Dockerfiles/webserver/.
34    image: webserver
35    container_name: WS3
36    networks:
37      - Internal
38    depends_on:
39      - Syslogserver
40    logging:
41      driver: syslog
```

```

42     options:
43         syslog-address: "tcp://localhost:514"
44         tag: "WS3"
45     restart: unless-stopped
46 WebServer4:
47     build: Dockerfiles/webserver/.
48     image: webserver
49     container_name: WS4
50     networks:
51         - Internal
52     depends_on:
53         - Syslogserver
54     logging:
55         driver: syslog
56         options:
57             syslog-address: "tcp://localhost:514"
58             tag: "WS4"
59     restart: unless-stopped
60 LoadBalancer:
61     build: Dockerfiles/load-balancer/.
62     image: loadbalancer
63     container_name: LB
64     networks:
65         - Internal
66         - External
67     ports:
68         - "80:80"
69     depends_on:
70         - WebServer1
71         - WebServer2
72         - WebServer3
73         - WebServer4
74         - Syslogserver
75     logging:
76         driver: syslog
77         options:
78             syslog-address: "tcp://localhost:514"
79             tag: "LB"
80     restart: unless-stopped
81 Syslogserver:
82     build: Dockerfiles/rsyslog/.
83     image: syslogserver
84     container_name: Syslog
85     volumes:
86         - "[CARTELLA LOCALE LOG]:/var/log"
87     ports:
88         - 514:514
89         - 514:514/udp
90     cap_add:
91         - SYSLOG
92     restart: unless-stopped
93
94 networks:

```

```

95 Internal:
96     internal: true
97 External:

```

Listing 1: Docker Compose Progetto

1.1.2 Analisi Docker Compose

Nel file sono presenti 6 servizi di cui: 4 web server, 1 load balancer e 1 server log.

In questa configurazione l'unica porta da esporre verso l'esterno è la 80 indirizzata all'ip della macchina su cui girano tutti i servizi.

Verrà esposta anche la 514 ma NON è necessario esporla fuori dalla lan locale.

I dettagli di configurazione dei vari servizi verranno analizzati in seguito nelle relative sezioni, si noti però che tutti i servizi hanno delle caratteristiche comuni:

- *build*: Eventuale percorso al Dockerfile per costruire l'immagine
- *image*: Nome dell'immagine da usare O nome dell'immagine costruita tramite build
- *container_name*: Nome univoco nel sistema del container
- *networks*: Lista di network a cui collegare il sistema
- *depends_on*: Lista di servizi da avviare prima del servizio in questione
- *logging*
 - *syslog-address*: Indirizzo del server di log, in questo caso *localhost*
 - *tag*: Nome del servizio con cui identificarsi nel log server
- *restart*: azione da intraprendere in caso di errore o arresto anomalo

1.1.3 Versione effettiva

Versione utile in un ambiente reale.

In questo caso il load balancer e i webserver vengono eseguiti su macchine diverse.

```

1 version: "3"
2
3 services:
4   LoadBalancer:
5     build: Dockerfiles/load-balancer/.
6     image: loadbalancer
7     container_name: LB
8     ports:
9       - "80:80"
10    depends_on:
11      - Syslogserver
12    logging:
13      driver: syslog

```

```

14     options:
15         syslog-address: "tcp://localhost:514"
16         tag: "LB"
17     restart: unless-stopped
18 Syslogserver:
19     build: Dockerfiles/rsyslog/.
20     image: syslogserver
21     container_name: Syslog
22     volumes:
23         - "[CARTELLA LOCALE LOG]:/var/log"
24     ports:
25         - 514:514
26         - 514:514/udp
27     cap_add:
28         - SYSLOG
29     restart: unless-stopped

```

Listing 2: Docker Compose Reale Load Balancer

Nel primo file troviamo il load balancer e il server log.

La porta 80 del load balancer deve essere esposta al di fuori della lan locale, la 514 del server log deve essere esposta SOLO SE le macchine su cui gireranno i webserver saranno al di fuori della rete locale.

```

1 version: "3"
2
3 services:
4     WebServer:
5         build: Dockerfiles/webserver/.
6         image: webserver
7         container_name: WS
8         depends_on:
9             - Syslogserver
10        logging:
11            driver: syslog
12            options:
13                syslog-address: "tcp://[IP Syslogserver]:514"
14                tag: "WS-N"
15        restart: unless-stopped

```

Listing 3: Docker Compose Reale Load Balancer

Nel secondo file troviamo la configurazione di un webserver.

Questo dockerfile verrà distribuito a tutte le macchine che dovranno ospitare un webserver.

È necessario aggiornare l'indirizzo del server di log in *syslog-server* con l'indirizzo della macchina su cui gira il servizio Syslogserver, è inoltre necessario inserire un id univoco nella sezione *tag* del logging al fine di consentire al server log di distinguere tra le varie istanze del webserver.

Dato che non abbiamo più un network docker, è necessario esporre le porte 80 di tutti gli host alla rete interna, al fine di consentire al load balancer reindirizzare le richieste.

```
1 docker compose up
2
3 [1] Running 8/8
4   Container syslog    Created
5   Container WS1       Created
6   Container WS2       Created
7   Container WS3       Created
8   Container WS4       Created
9   Container LB        Created
10
11 Attaching to LB, Syslog, WS1, WS2, WS3, WS4
12
13 Syslog | syslogd: 3.23.0: running as uid 1, enabling container-specific defaults, press ctrl-c to terminate syslog
14 WS1 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
15 WS2 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
16 WS2 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
17 WS2 | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
18 WS2 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
19 WS2 | /docker-entrypoint.sh: Configuration complete; ready for start up
20 WS2 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
21 WS4 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
22 WS4 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
23 WS4 | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
24 WS4 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
25 WS4 | /docker-entrypoint.sh: Configuration complete; ready for start up
26 WS4 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
27 WS4 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
28 WS4 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
29 WS4 | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
30 WS4 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
31 WS4 | /docker-entrypoint.sh: Configuration complete; ready for start up
32 WS1 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
33 WS1 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
34 WS1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
35 WS1 | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
36 WS1 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
37 WS1 | /docker-entrypoint.sh: Configuration complete; ready for start up
38 WS3 | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
39 WS3 | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
40 WS3 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
41 WS3 | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
42 WS3 | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
43 WS3 | /docker-entrypoint.sh: Configuration complete; ready for start up
44 LB | /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
45 LB | /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
46 LB | /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ip6-by-default.sh
47 LB | 10-listen-on-ip6-by-default.sh: info: IP6V listen already enabled
48 LB | /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
49 LB | /docker-entrypoint.sh: Configuration complete; ready for start up
50
51 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
52
53 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
54
55 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET /favicon.ico HTTP/1.1" 404 355 "http://172.8.0.1/" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
56
57 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
58
59 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
60
61 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
62
63 172.25.0.1 - - [28/Jun/2021:14:26:07 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
64
65 172.25.0.1 - - [28/Jun/2021:14:26:15 +0000] "GET / HTTP/1.1" 304 0 "-" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
```

Figura 1: Log di avvio servizi e richieste distribuite

1.2 Screenshot funzionamento

Come si vede dalla Figura 1, il primo servizio avviato è il server log, seguito dai 4 webserver in parallelo e, per ultimo, dal load balancer.

Una volta avviato, il load balancer risponde alle richieste dei client distribuendole tra i server definiti nel config, come visibile nelle ultime righe della Figura 1.

Nella Figura 2 si può notare il template del server di log in azione, i file vengono suddivisi secondo il template e, come previsto, ogni ora viene generato un nuovo file di log.

La Figura 3 mostra il contenuto di uno dei file di log del server di log (??).

Ogni riga contiene:

1. Un timestamp di ricezione del log
2. Indirizzo ip del mittente
3. Tag del servizio
4. Pid del servizio
5. Messaggio

Come previsto i messaggi mostrati in Figura 3 corrispondono con i log del servizio LB visti in Figura 1.

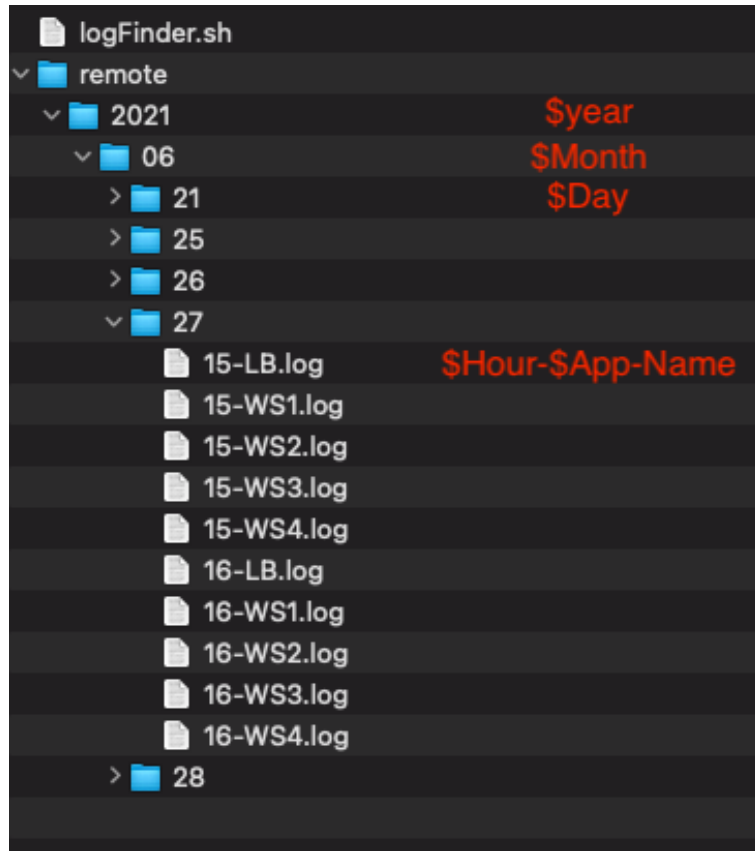


Figura 2: Cartella di salvataggio server di log (??)

```

1 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
2 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
3 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
4 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: 10-listen-on-ipv6-by-default.sh: info: IPv6 listen already enabled
5 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
6 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: Launching /docker-entrypoint.d/30-listen-on-udp.sh
7 2021-06-28T14:25:25+08:00 172.27.0.1 LB[1748]: /docker-entrypoint.sh: Configuration complete; ready for start up
8 2021-06-28T14:26:07+08:00 172.27.0.1 LB[1748]: 172.26.0.1 - - [28/Jun/2021:14:26:07 +0800] "GET / HTTP/1.1" 304 0 "-" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
9 2021-06-28T14:26:07+08:00 172.27.0.1 LB[1748]: 172.26.0.1 - - [28/Jun/2021:14:26:07 +0800] "GET /favicon.ico HTTP/1.1" 404 555 "http://172.0.0.1/" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
10 2021-06-28T14:26:12+08:00 172.27.0.1 LB[1748]: 172.26.0.1 - - [28/Jun/2021:14:26:12 +0800] "GET / HTTP/1.1" 304 0 "-" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
11 2021-06-28T14:26:15+08:00 172.27.0.1 LB[1748]: 172.26.0.1 - - [28/Jun/2021:14:26:15 +0800] "GET / HTTP/1.1" 304 0 "-" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
12 2021-06-28T14:26:15+08:00 172.27.0.1 LB[1748]: 172.26.0.1 - - [28/Jun/2021:14:26:15 +0800] "GET / HTTP/1.1" 304 0 "-" Mozilla/5.0 (Macintosh; Intel Mac OS X 10_15_7) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4472.114 Safari/537.36"
13

```

Figura 3: Contenuto del file di log 2021/06/28/14-LB.log