

## 3.5 实战案例——DNS 服务与管理

### 3.5.1 案例目标

- (1) 了解 BIND 服务的安装配置。
- (2) 使用 bind-chroot 搭建 DNS 服务。
- (3) 配置 DNS 服务的正反向解析。

### 3.5.2 案例分析

#### 1.规划节点

部署主从节点 DNS 服务的节点规划，见表 3-5-1。

表 3-5-1 主从节点 DNS 服务的节点规划

IP	主机名	节点
172.16.51.8	master	主 DNS 服务器
172.16.51.21	slaver	从 DNS 服务器

#### 2.基础准备

使用 VMWare Workstation 软件安装 CentOS 7.2 操作系统，镜像使用提供的 CentOS-7-x86\_64-DVD-1511.iso，最小化 CentOS 7.2 虚拟机两台。YUM 源使用本地 CentnOS 7.2 系统源。

### 3.5.3 案例实施

#### 1.配置 YUM 源（两个节点）

- (1) YUM 源备份

```
[root@master ~]# mv /etc/yum.repos.d/* /opt/
```

- (2) 创建 repo 文件 **【/\*\*此处应该配置本地仓库，原手册有错】**

```
[root@master ~]# vi /etc/yum.repos.d/local.repo
```

```
[centos]
```

```
name=centos
```

```
baseurl=file:///opt/centos（如果配置 ftp 就需要安装 ftp）
```

```
gpgcheck=0
```

```
enabled=1
```

(3) 测试 YUM 源配置

```
[root@master ~]# yum list
```

(4) 关闭防火墙和 selinux

```
[root@master ~]# setenforce 0
```

```
[root@master ~]# systemctl stop firewalld
```

## 2. 安装配置 DNS 软件 BIND (两个节点)

①使用如下命令安装 bind-chroot DNS 服务器，示例结果如图 3-7-1 所示。

```
[root@master ~]# yum install bind-chroot bind-utils -y
```

```
[root@master ~]# yum install bind-chroot bind-utils -y
Loaded plugins: fastestmirror
centos | 3.6 kB 00:00
(1/2): centos/group_gz | 155 kB 00:01
(2/2): centos/primary_db | 2.8 MB 00:01
Determining fastest mirrors
Resolving Dependencies
--> Running transaction check
--> Package bind-chroot.x86_64 32:9.9.4-29.el7 will be installed
--> Processing Dependency: bind = 32:9.9.4-29.el7 for package: 32:bind-chroot-9.9.4-29.el7.x86_64
--> Package bind-utils.x86_64 32:9.9.4-29.el7 will be installed
--> Processing Dependency: bind-libs = 32:9.9.4-29.el7 for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: liblwres.so.90()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: libiscfg.so.90()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: libisccc.so.90()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: libisc.so.95()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: libdns.so.100()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Processing Dependency: libbind9.so.90()(64bit) for package: 32:bind-utils-9.9.4-29.el7.x86_64
--> Running transaction check
```

图 3-5-1 安装 bind-chroot 软件包

②通过 rpm -ql bind-chroot 查询所安装的文件，如图 3-5-2 所示。

```
[root@master ~]# rpm -ql bind-chroot
```

```
[root@master ~]# rpm -ql bind-chroot
/usr/lib/systemd/system/named-chroot-setup.service
/usr/lib/systemd/system/named-chroot.service
/usr/libexec/setup-named-chroot.sh
/var/named/chroot
/var/named/chroot/dev
/var/named/chroot/dev/null
/var/named/chroot/dev/random
/var/named/chroot/dev/zero
/var/named/chroot/etc
/var/named/chroot/etc/named
/var/named/chroot/etc/named.conf
/var/named/chroot/etc/pki
/var/named/chroot/etc/pki/dnssec-keys
/var/named/chroot/run
/var/named/chroot/run/named
/var/named/chroot/usr
/var/named/chroot/usr/lib64
/var/named/chroot/usr/lib64/bind
/var/named/chroot/var
/var/named/chroot/var/log
/var/named/chroot/var/named
/var/named/chroot/var/run
/var/named/chroot/var/tmp
```

图 3-5-2 查询 bind-chroot 安装文件

③进入 bind-chroot 目录，如图 3-5-3 所示。

```
[root@master ~]# cd /var/named/chroot/
[root@master chroot]# ll
total 0
drwxr-x--- 2 root named 41 Oct 4 05:36 dev
drwxr-x--- 4 root named 28 Oct 4 05:36 etc
drwxr-x--- 3 root named 18 Oct 4 05:36 run
drwxrwx--- 3 named named 18 Oct 4 05:36 usr
drwxr-x--- 5 root named 48 Oct 4 05:36 var
```

图 3-5-3 bind-chroot 目录

④启动 named-chroot 服务，并查看 bind-chroot 相关文件，如图 3-5-4 所示。

```
[root@localhost]# systemctl start named-chroot
```

```
[root@localhost ~]# ll /var/named/chroot/etc/
```

```
[root@localhost ~]# ll /var/named/chroot/var/
```

```
[root@localhost ~]# ll /var/named/chroot/etc/
total 24
-rw-r--r--. 5 root root 388 Oct 8 2015 localtime
drwxr-x---. 2 root named 6 Nov 20 2015 named
-rw-r-----. 1 root named 1558 Jun 1 2015 named.conf
-rw-r--r--. 1 root named 2389 Nov 20 2015 named.iscdlv.key
-rw-r-----. 1 root named 931 Jun 21 2007 named.rfc1912.zones
-rw-r--r--. 1 root named 487 Jul 19 2010 named.root.key
drwxr-x---. 3 root named 24 Nov 14 07:16 pki
-rw-r-----. 1 root named 77 Nov 14 07:18 rndc.key
[root@localhost ~]# ll /var/named/chroot/var/
total 4
drwxrwx---. 2 named named 6 Nov 20 2015 log
drwxr-x---. 6 root named 4096 Nov 14 07:16 named
lrwxrwxrwx. 1 named named 6 Nov 14 07:16 run -> ../run
drwxrwx---. 2 named named 6 Nov 20 2015 tmp
```

图 3-5-4 拷贝 bind 文件

⑤创建 dynamic 目录，将 bind 文件设置为可写，如图 3-5-5 所示。

```
[root@master chroot]# cd var/named/
```

```
[root@master named]# chmod -R 777 /var/named/chroot/var/named/data/
```

```
[root@master named]# mkdir dynamic
```

```
[root@master named]# chmod -R 777 /var/named/chroot/var/named/dynamic/
```

```
[root@master chroot]# cd var/named/
[root@master named]# chmod -R 777 /var/named/chroot/var/named/data/
[root@master named]# ll
total 24
drwxrwxrwx 2 root root 6 Oct 4 06:26 data
-rw-r--r-- 1 root root 56 Oct 4 06:26 my.external.zone.db
-rw-r--r-- 1 root root 56 Oct 4 06:26 my.internal.zone.db
-rw-r--r-- 1 root root 2076 Oct 4 06:26 named.ca
-rw-r--r-- 1 root root 152 Oct 4 06:26 named.empty
-rw-r--r-- 1 root root 152 Oct 4 06:26 named.localhost
-rw-r--r-- 1 root root 168 Oct 4 06:26 named.loopback
drwxr-xr-x 2 root root 69 Oct 4 06:26 slaves
[root@master named]# mkdir dynamic
[root@master named]# chmod -R 777 /var/named/chroot/var/named/dynamic/
[root@master named]#
```

图 3-5-5 创建目录并设置权限

⑥将DNS服务 `named.conf` 文件拷贝到 `bind-chroot` 目录中，如图 3-5-6 所示。

```
[root@master chroot]# cp /etc/named.conf /var/named/chroot/etc/named.conf  
[root@master named]# cp /etc/named.conf /var/named/chroot/etc/named.conf  
cp: overwrite '/var/named/chroot/etc/named.conf'? y  
[root@master named]#
```

图 3-5-6 拷贝配置文件

编辑配置文件 `named.conf`，具体示例代码如下：

【修改两个 `any`，添加一个区域文件配置，修改 11、12、17 行，文件末尾增加 `zone` 配置文件】

```
[root@master chroot]# vi /var/named/chroot/etc/named.conf  
  
//  
  
// named.conf  
  
//  
  
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS  
// server as a caching only nameserver (as a localhost DNS resolver only).  
  
//  
  
// See /usr/share/doc/bind*/sample/ for example named configuration files.  
  
//  
  
options {  
    listen-on port 53 { any; };  
    // listen-on-v6 port 53 { ::1; };  
    directory "/var/named";  
    dump-file "/var/named/data/cache_dump.db";  
    statistics-file "/var/named/data/named_stats.txt";  
    memstatistics-file "/var/named/data/named_mem_stats.txt";  
    allow-query { any; };  
    /*  
    - If you are building an AUTHORITATIVE DNS server, do NOT enable  
recursion.  
  
    - If you are building a RECURSIVE (caching) DNS server, you need to enable
```

recursion.

- If your recursive DNS server has a public IP address, you MUST enable access control to limit queries to your legitimate users. Failing to do so will cause your server to become part of large scale DNS amplification attacks. Implementing BCP38 within your network would greatly reduce such attack surface

```
*/
```

```
recursion yes;
```

```
dnssec-enable yes;
```

```
dnssec-validation yes;
```

```
/* Path to ISC DLV key */
```

```
bindkeys-file "/etc/named.iscdlv.key";
```

```
managed-keys-directory "/var/named/dynamic";
```

```
pid-file "/run/named/named.pid";
```

```
session-keyfile "/run/named/session.key";
```

```
};
```

```
logging {
```

```
    channel default_debug {
```

```
        file "data/named.run";
```

```
        severity dynamic;
```

```
    };
```

```
};
```

```
zone "test.com" {
```

```
    type master;
```

```
    file "test.com.zon";
```

```
};
```

```
include "/etc/named.rfc1912.zones";
```

```
include "/etc/named.root.key";
```

设置 named.conf 文件的用户权限为 named，示例代码如下：

```
[root@master named]# chown named /var/named/chroot/etc/named.conf
```

⑦创建转发域。

拷贝模板文件 named.localhost 到 test.com.zon，示例代码如下：

```
[root@master named]# cp /var/named/chroot/var/named/named.localhost  
/var/named/chroot/var/named/test.com.zon
```

编辑 test.com.zon 文件，示例代码如下：

```
[root@master named]# vi test.com.zon
```

```
$TTL 1D
```

```
$ORIGIN test.com.
```

```
@ IN SOA test.com. admin.test.com. (
```

```
2019001; serial
```

```
1D ; refresh
```

```
1H ; retry
```

```
1W ; expire
```

```
3H ; minimum
```

```
)
```

```
IN NS ns1.test.com.
```

```
ns1 IN A 172.16.50.10
```

```
www IN A 172.16.51.31
```

```
ftp IN A 172.16.51.4
```

赋予 test.com.zon 所有权限，命令如下：

```
chmod -R 777 test.com.zon
```

⑧检查配置，如图 3-5-7 所示。

```
[root@master named]# named-checkconf /var/named/chroot/etc/named.conf
```

```
[root@master named]# named-checkzone test.com test.com.zon
```



```
[root@master named]# named-checkconf /var/named/chroot/etc/named.conf
[root@master named]# named-checkzone test.com test.com.zon
zone test.com/IN: loaded serial 2019001
OK
[root@master named]#
```

图 3-5-7 检查配置

### ⑨配置服务

设置主机时间，示例代码如下：

```
[root@master named]# date -s 15:47:00
```

关闭 named 服务，取消开机启动，命令如下：

```
[root@master named]# systemctl stop named
```

```
[root@master named]# systemctl disable named
```

设置 bind-chroot 服务开机启动，并重启。

```
[root@master named]# systemctl enable named-chroot
```

```
ln -s '/usr/lib/systemd/system/named-chroot.service'
```

```
'/etc/systemd/system/multi-user.target.wants/named-chroot.service'
```

```
[root@master named]# systemctl restart named-chroot
```

查看 bind-chroot 服务状态，如图 3-5-8 所示。

```
[root@master named]# systemctl status named-chroot
```

```
[root@master named]# systemctl status named-chroot
named-chroot.service - Berkeley Internet Name Domain (DNS)
Loaded: loaded (/usr/lib/systemd/system/named-chroot.service; enabled)
Active: active (running) since Fri 2019-10-04 15:22:47 UTC; 28min ago
Process: 1877 ExecStop=/bin/sh -c /usr/sbin/rndc stop > /dev/null 2>&1 || /bin/kill -TERM $MAINPID (code=exited, status=0/SUCCESS)
Process: 11650 ExecReload=/bin/sh -c /usr/sbin/rndc reload > /dev/null 2>&1 || /bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)
Process: 11958 ExecStart=/usr/sbin/named -u named -t /var/named/chroot $OPTIONS (code=exited, status=0/SUCCESS)
Process: 11953 ExecStartPre=/bin/bash -c if [ ! "$DISABLE_ZONE_CHECKING" == "yes" ]; then /usr/sbin/named-checkconf -z /etc/named.conf; else echo "checking of zone files is disabled"; fi (code=exited, status=0/SUCCESS)
Main PID: 11959 (named)
CGroup: /system.slice/named-chroot.service
└─11959 /usr/sbin/named -u named -t /var/named/chroot -4

Oct 04 15:24:07 master named[11959]: automatic empty zone: 255.255.255.255.IN-ADDR.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.....ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: D.F.IP6.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: 8.E.F.IP6.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: 9.E.F.IP6.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: A.E.F.IP6.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: B.E.F.IP6.ARPA
Oct 04 15:24:07 master named[11959]: automatic empty zone: 8.B.D.0.1.0.0.2.IP6.ARPA
Oct 04 15:24:07 master named[11959]: reloading configuration succeeded
Oct 04 15:24:07 master named[11959]: any newly configured zones are now loaded
Hint: some lines were ellipsized, use -l to show in full.
```

图 3-5-8 查看 bind-chroot 服务状态

⑩配置主机 DNS 服务器。

```
[root@master named]# vi /etc/resolv.conf
```

```
; generated by /usr/sbin/dhclient-script
```

```
search openstacklocal localdomain.localdomain
```

```
nameserver 172.16.51.8
```

```
//修改为当前主机 IP
```

⑪使用 bind 基本命令重载主配置文件和区域解析库文件，如图 3-5-9 所示。

```
[root@master named]# rndc reload
```

```
[root@master named]# rndc reload test.com
```

```
[root@master named]# rndc notify test.com
```

```
[root@master named]# rndc reconfig
```

```
[root@master named]# rndc reload
server reload successful
[root@master named]# rndc reload test.com
zone reload up-to-date
[root@master named]# rndc notify test.com
zone notify queued
[root@master named]# rndc reconfig
```

图 3-5-9 重载文件

②测试 DNS 解析是否正常，如图 3-5-10 所示。

```
[root@master named]# ping www.test.com
PING www.test.com (172.16.51.31) 56(84) bytes of data.
64 bytes from 172.16.51.31: icmp_seq=1 ttl=64 time=0.419 ms
64 bytes from 172.16.51.31: icmp_seq=2 ttl=64 time=0.401 ms
^C
--- www.test.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1000ms
rtt min/avg/max/mdev = 0.401/0.410/0.419/0.009 ms
```

图 3-5-10 测试 DNS 解析

附加测试方法一：

```
[root@localhost named]# nslookup
```

```
> server
```

```
Default server: 20.0.0.104
```

/\*\*需要跟实际试验环境的服务器 IP 地址一致

```
Address: 20.0.0.104#53
```

```
> www.test.com
```

```
Server: 20.0.0.104
```

```
Address: 20.0.0.104#53
```

```
Name: www.test.com
```

```
Address: 172.16.51.31
```

附加测试方法二：

```
[root@localhost named]# dig www.test.com
```

```
; <<>> DiG 9.9.4-RedHat-9.9.4-29.el7 <<>> www.test.com
```

```
;; global options: +cmd
```

```
;; Got answer:
```

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 25927
```



```
:: flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 4096
;; QUESTION SECTION:
;www.test.com.                IN      A

;; ANSWER SECTION:
www.test.com.                 86400   IN      A      172.16.51.31

;; AUTHORITY SECTION:
test.com.                     86400   IN      NS      ns1.test.com.

;; ADDITIONAL SECTION:
ns1.test.com.                 86400   IN      A      172.16.50.10

;; Query time: 0 msec
;; SERVER: 20.0.0.104#53(20.0.0.104)
;; WHEN: Thu Nov 14 07:43:07 CST 2019
;; MSG SIZE   rcvd: 91
```

### 3.配置主从 DNS

①在 Master 上操作，修改 Master 的 named.conf 配置文件。【修改 zone 配置部分：红色字体】

```
[root@master chroot]# vi /var/named/chroot/etc/named.conf

//
// named.conf
//
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
// server as a caching only nameserver (as a localhost DNS resolver only).
//
```

```

// See /usr/share/doc/bind*/sample/ for example named configuration files.

//

options {
    listen-on port 53 { any; };
    // listen-on-v6 port 53 { ::1; };
    directory      "/var/named";
    dump-file       "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    allow-query     { any; };

    /*
     - If you are building an AUTHORITATIVE DNS server, do NOT enable
recursion.

     - If you are building a RECURSIVE (caching) DNS server, you need to enable
        recursion.

     - If your recursive DNS server has a public IP address, you MUST enable access
        control to limit queries to your legitimate users. Failing to do so will
        cause your server to become part of large scale DNS amplification
        attacks. Implementing BCP38 within your network would greatly
        reduce such attack surface

    */
    recursion yes;

    dnssec-enable yes;
    dnssec-validation yes;

    /* Path to ISC DLV key */
    bindkeys-file "/etc/named.iscdlv.key";

```

```

        managed-keys-directory "/var/named/dynamic";

        pid-file "/run/named/named.pid";

        session-keyfile "/run/named/session.key";

};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

zone "test.com" {
    type master;
    file "test.com.zon";
    allow-transfer {172.16.51.21;};
    notify yes;
    also-notify {172.16.51.21;};
};

include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";

```

②在 Master 编辑主服务器解析库文件，添加解析记录，示例代码如下。

```
[root@master chroot]# cat var/named/test.com.zon
```

```
$TTL 1D
```

```
$ORIGIN test.com.
```

```
@    IN SOA  test.com. admin.test.com. (
```

```
2019002; serial
```

```
//改值比修改前的要大，才能同步
```

```

        1D ; refresh

        1H ; retry

        1W ; expire

        3H ; minimum

    )

    IN NS ns1.test.com.

ns1 IN A 172.16.50.10

www IN A 172.16.51.31

www2 IN A 172.16.51.9 //添加记录

ftp IN A 172.16.51.4

```

③重新加载配置文件，如图 3-5-11 所示。

```

[root@master chroot]# rndc reload
server reload successful
[root@master chroot]# tail -f /var/log/messages
Oct 4 16:21:19 localhost named[11959]: automatic empty zone: 9.E.F.IP6.ARPA
Oct 4 16:21:19 localhost named[11959]: automatic empty zone: A.E.F.IP6.ARPA
Oct 4 16:21:19 localhost named[11959]: automatic empty zone: B.E.F.IP6.ARPA
Oct 4 16:21:19 localhost named[11959]: automatic empty zone: 8.B.D.0.1.0.0.2.IP6.ARPA
Oct 4 16:21:19 localhost named[11959]: reloading configuration succeeded
Oct 4 16:21:19 localhost named[11959]: reloading zones succeeded
Oct 4 16:21:19 localhost named[11959]: zone test.com/IN: loaded serial 2019002
Oct 4 16:21:19 localhost named[11959]: zone test.com/IN: sending notifies (serial 2019002)
Oct 4 16:21:19 localhost named[11959]: all zones loaded
Oct 4 16:21:19 localhost named[11959]: running

```

图 3-5-11 重载配置

④在 slave 上操作，修改 slave 服务器上的 named.conf 文件，示例代码如下：

```

[root@slave named]# vi /var/named/chroot/etc/named.conf

//

// named.conf

//

// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS

// server as a caching only nameserver (as a localhost DNS resolver only).

//

// See /usr/share/doc/bind*/sample/ for example named configuration files.

//

options {

```

```

listen-on port 53 { any; };

// listen-on-v6 port 53 { ::1; };

directory      "/var/named";

dump-file      "/var/named/data/cache_dump.db";

statistics-file "/var/named/data/named_stats.txt";

memstatistics-file "/var/named/data/named_mem_stats.txt";

allow-query    { any; };

/*

- If you are building an AUTHORITATIVE DNS server, do NOT enable
recursion.

- If you are building a RECURSIVE (caching) DNS server, you need to enable
  recursion.

- If your recursive DNS server has a public IP address, you MUST enable access
  control to limit queries to your legitimate users. Failing to do so will
  cause your server to become part of large scale DNS amplification
  attacks. Implementing BCP38 within your network would greatly
  reduce such attack surface

*/

recursion yes;

dnssec-enable yes;

dnssec-validation yes;

/* Path to ISC DLV key */

bindkeys-file "/etc/named.iscdlv.key";

managed-keys-directory "/var/named/dynamic";

pid-file "/run/named/named.pid";

```

```

        session-keyfile "/run/named/session.key";

};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

zone "test.com" {
    type slave;
    file "slaves/test.com.zon";
    masters { 172.16.51.8; };
};

include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";

```

⑤设置 slaves 目录权限和目录的所有者为 named 用户，示例代码如下。

```

[root@slave ~]# chmod -R 777 /var/named/chroot/var/named/slaves/
[root@slave ~]# chown -R named:named /var/named/chroot/var/named/slaves/

```

⑥检查语法，并在 master 和 slave 重启服务。

```

[root@slave ~]# named-checkconf /var/named/chroot/etc/named.conf
[root@slave ~]# systemctl restart named-chroot

```

⑦查看从服务器是否有文件同步进来，如图 3-5-12 所示

```

[root@slave ~]# ll /var/named/chroot/var/named/slaves/

```

[root@slave ~]# ll /var/named/chroot/var/named/slaves/									
total 12									
-rwxrwxrwx	1	named	named	56	Oct	4	06:26	my.ddns.internal.zone.db	
-rwxrwxrwx	1	named	named	56	Oct	4	06:26	my.slave.internal.zone.db	
-rw-r--r--	1	named	named	309	Oct	4	16:32	test.com.zon	

图 3-5-12 查看 slaves 目录

⑧在 master 主机用从服务器解析，（@后面指定 DNS 服务器的地址，就可以不用改本



机的 DNS 了），解析到 www2 域名，表明配置成功，如图 3-5-13 所示。

```
[root@master named]# dig www2.test.com @172.16.51.21
; <<>> DiG 9.9.4-RedHat-9.9.4-29.el7 <<>> www2.test.com @172.16.51.21
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 30255
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 2

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:; udp: 4096
;; QUESTION SECTION:
;www2.test.com.                IN      A

;; ANSWER SECTION:
www2.test.com.                 86400   IN      A      172.16.51.9

;; AUTHORITY SECTION:
test.com.                      86400   IN      NS      ns1.test.com.

;; ADDITIONAL SECTION:
ns1.test.com.                  86400   IN      A      172.16.50.10

;; Query time: 1 msec
;; SERVER: 172.16.51.21#53(172.16.51.21)
;; WHEN: Fri Oct 04 16:50:23 UTC 2019
;; MSG SIZE rcvd: 92
```

图 3-5-13 测试从节点解析