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setup gdb on mac silicon

this guide doesnt cover how to debug `elf` binaries, only focusing on how to setup gdb mac silicon. if you want to debug `elf` binaries, you can read this post instead.

prerequisites

INSTALL GDB AND QEMU

```
brew install gdb qemu
```

signing gdb

signing gdb is required on macos because the kernel (specifically the taskgated service) restricts debuggers from controlling other processes for security.

- gdb needs system privileges to inspect processes
- macos treats this as high-risk, preventing malware easily taking over other processes

in my opinion this is a good choice made by apple because it ensures that only trusted debuggers can inspect processes, reducing the risk of malicious actors gaining unauthorized access to sensitive information.

create certificate configuration

```
cat > /tmp/gdb-cert.conf <<EOF
[ req ]
default_bits       = 2048
distinguished_name = req_distinguished_name
x509_extensions    = v3_ca
prompt             = no
```

```
[ req_distinguished_name ]
CN = gdb-cert
[ v3_ca ]
basicConstraints = CA:TRUE
keyUsage = critical,digitalSignature
extendedKeyUsage = codeSigning
EOF
```

generate self-signed certificate

```
openssl req -new -newkey rsa:2048 -days 3650 -nodes -x509 \
  -keyout /tmp/gdb-cert.key \
  -out /tmp/gdb-cert.crt \
  -config /tmp/gdb-cert.conf
```

import certificate and key directly into system keychain

```
sudo security import /tmp/gdb-cert.crt -k /Library/Keychains/System.keyc
```

```
sudo security import /tmp/gdb-cert.key -k /Library/Keychains/System.keyc
```

trust the certificate (prompts for your password (or touch id))

```
sudo security add-trusted-cert -d -r trustRoot \
  -k /Library/Keychains/System.keychain /tmp/gdb-cert.crt
```

create entitlements file

```
cat > /tmp/gdb-entitlement.xml <<EOF
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple.c
<plist version="1.0">
<dict>
```

```
    <key>com.apple.security.cs.debugger</key>
    <true/>
</dict>
</plist>
EOF
```

sign gdb and verify

```
codesign --entitlements /tmp/gdb-entitlement.xml -fs gdb-cert $(which gd
```

```
codesign -vv $(which gdb)
```

i know it was a little bit tricky to get right, but it's worth it to have a fully functional gdb on macOS.

gdb debug mac