SVEUČILIŠTE U ZAGREBU

FAKULTET ORGANIZACIJE I INFORMATIKE

V A R A Ž D I N

PassLock

**PROJEKT IZ KOLEGIJA „Sigurnost informacijskih sustava“**

Varaždin, 2018.

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**GitHub repozitorij:** [**github.com/jkristovi/PassLock**](https://github.com/jkristovi/PassLock)

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# Ideja projekta

Ideja za ovu aplikaciju je došla iz toga da na kolegiju Sigurnost informacijskih sustava se mora napraviti nekakav praktičan projekt. Sam kolegij je jako zanimljiv, te se moglo jako puno toga naučiti o (ne)sigurnosti stvari i sustava koje svakodnevno koristimo i kojima smo okruženi. Štoviše, naučili smo i da koliko god se zaštitimo, nikad nismo u potpunosti sigurni, te da je najviše što možemo učiniti sa naše strane to da smanjimo sve rizike koje možemo primijetiti na minimum, koristeći neke od mjera opreza.

Nadahnuti tom idejom i misli, odlučili smo se napraviti jednostavnu aplikaciju koja bi mogla svakome od nas povećati mjere opreza, odnosno smanjiti konkretne rizike na jednu nižu razinu – odlučili smo napraviti **PassLock** aplikaciju.

Svrha ove aplikacije je povećanje sigurnosti na internetu, odnosno korištenje lozinki koje je teško probiti korištenjem nekih tipičnih 'Dictionary Attack' ili sličnih brute force metoda.

Aplikacija omogućuje korisniku izradu popuno prenosive (eng. portable, transferable) SQLite baze podataka koja bi bila zaključana željenom šifrom od minimalno 8 znakova.

Nadalje, korisnik može unositi željene lozinke koje će koristiti pri prijavi u društvene mreže i ostale servise koje svakodnevno koristi, pritom birajući željeni broj znakova pri generiranju lozinke koja će biti pohranjena u SHA256 formatu.

Korisniku je također omogućena i daljnja izmjena generirane lozinke, gdje može mijenjati i dodavati posebne znakove, velika slova (koja su uvjet kod izrade lozinki na pojedinim online servisima), ponovno je kriptirati, brisati i tako dalje. Također, ukoliko to želi, korisnik može i promijeniti lozinku za otvaranje same baze.

Time smo zapravo naše lozinke koje svakodnevno koristimo osigurali ne samo od tipičnih Dictionary Attack metoda, već i organizirali na jedno mjesto što nam daje mogućnost da ih ne moramo pamtiti konstanto, već samo tu jednu koja bi ih sve štitila.

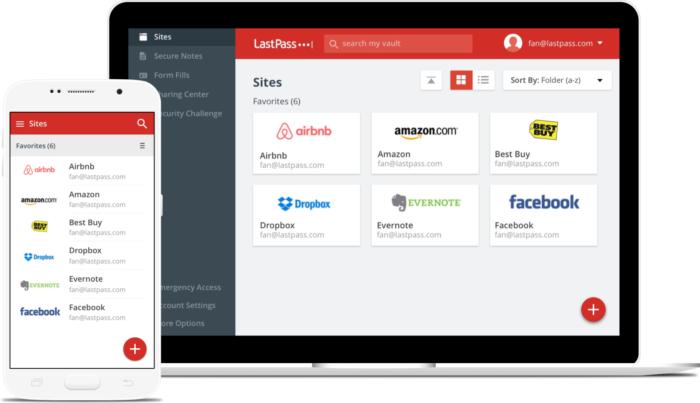
# Slične aplikacije

U daljnjem tekstu će biti prikazane neke slične aplikacije, također će biti prikazane pojedine činjenice aplikacija, tj. koji su njihovi nedostaci, a koje prednosti. Na tržištu postoji veliki broj aplikacija slične našoj, a neke od najpoznatijih i najkorištenijih su sljedeće:

* **LastPass**
* **KeePass**
* **StickyPassword**
* **RoboForm itd.**

Neke od aplikacija su potpuno besplatne, neke pak naplaćuju pojedine funkcionalnosti, a druge se potpuno naplaćuju. Nadalje druge aplikacije nude pohranu lozinki i računa lokalno na računalu, a druge aplikacije omogućuju pohranu podataka na oblaku (engl. Cloud), itd.

## 2.1 LastPass

Prva i jedna od najpoznatijih aplikacija za upravljanjem lozinkama i računima je LastPass. Aplikacija je dostupna na gotovo svim platformama, Windows, Android, IOS itd., što uvelike olakšava upravljanje velikim brojem digitalnih računa koji se koriste u svakodnevnom životu.

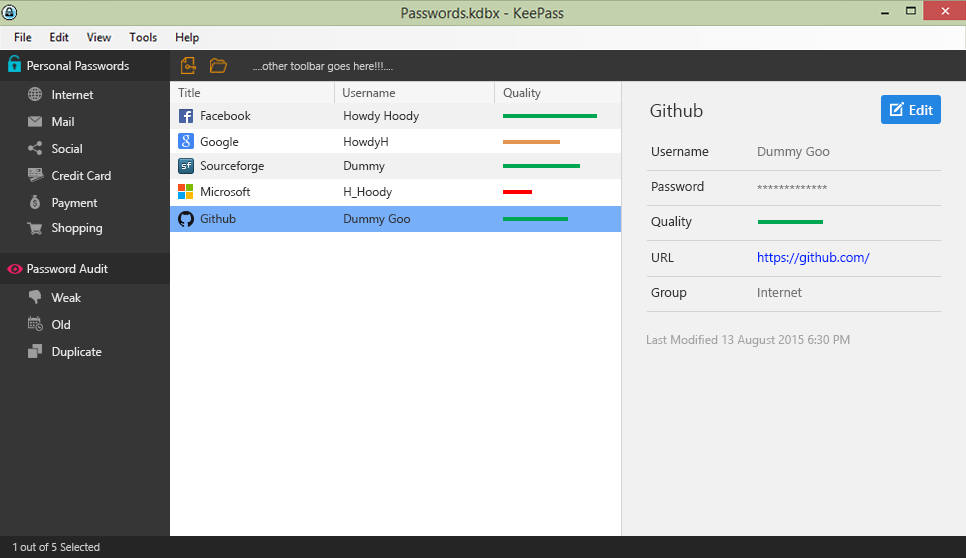
Slika 1. LastPass aplikacija

Nadalje, LastPass omogućuje pohranu lozinki i računa lokano na računalu u jednoj bazi ili pak na njihovim serverima, tj. na cloudu. Pohrana na računalu je nešto korisnija za one ljude koji koriste samo jedno računalo, a ona verzija s cloud pohranom je zgodnija za one ljude koji često mijenjaju radno okruženje, ali trebaju imati pristup svojim računima.

Njihov servis nudi veliki broj mogućnosti, a neke od njih su *two-factor authentication, form filling, automatic password capture*, itd. Također omogućuje unos podataka lozinki i računa s raznih pretraživača ili pak s drugih aplikacija sličnih LastPass-u.

Nedostatak mu je jedino taj što se naplaćuju njegove usluge, što svi korisnici nisu spremni se odlučiti, te zbog toga postoje neke druge, alternativne aplikacije.

## 2.2 KeePass

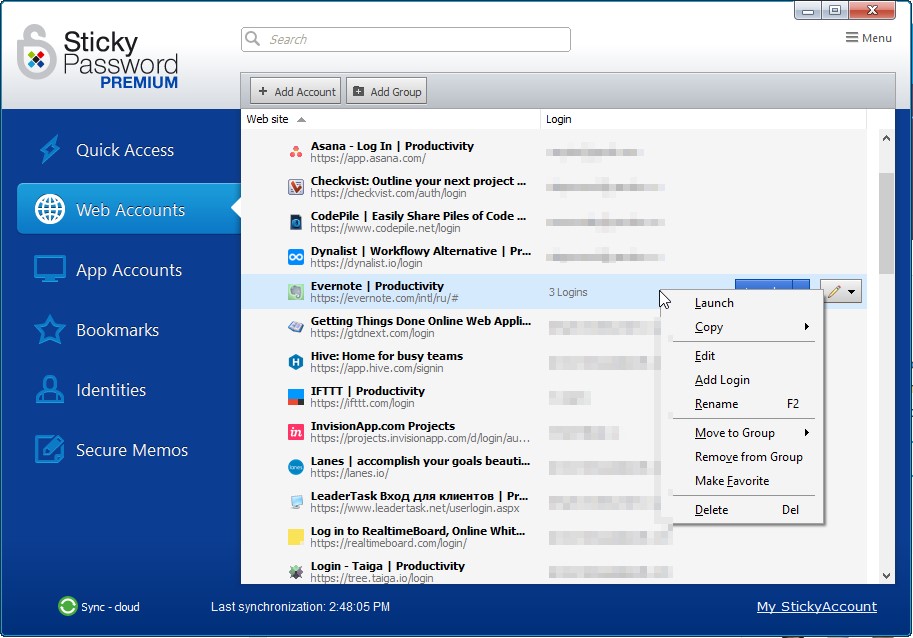
Jedna od besplatnih varijanti upravljanja računima i lozinkama je KeePass. KeePass je aplikacija otvorenog koda te vrlo jednostavnog karaktera, koja omogućuje tek ono osnovno i najvažnije, a to je upravljanje računima i lozinki.

Slika 2. KeePass aplikacija

KeePass je zamišljen samo kao alat za pohranu takvih podataka i ništa više, kako čovjek ne bih trebao pamtiti sve te silne podatke. Podaci su pohranjeni lokalno na računalu u jednoj bazi iza koje stoji glavni *(master)* račun i lozinka, te je potrebno samo tu jednu lozinku pamtiti kako bi imali pristup svim ostalim računima i lozinkama. Za kriptiranje baze koriste se AES i Twofish algoritmi, jedni od najsigurnijih algoritama za kriptiranje.

Nedostatak bi bio taj što iza svega stoji samo jedan račun i lozinka, pa ako netko dobije pristup tim podacima, također ima pristup svim ostalim. Osim toga, cijeli projekt je *open source* što znači da netko može proučiti izvorni kod aplikacije kako bi pronašao neke rupe i ranjivosti, te iskoristio ih iako je za time vrlo mala mogućnost, međutim treba uzeti u obzir.

## 2.3 StickyPassword

Zadnja aplikacija koja će biti opisana je *StickyPassword. StickyPassword* je vrlo sličan *LastPass*-u, samo što on nudi nekakve posebne mogućnosti uz samu funkcionalnost pohrane računa i lozinki.

Slika 3. Sticky Password aplikacija

*StickyPassword* omogućuje automatsku ispunu obrasca, upravljanje lozinkama, dvostupanjska autentifikacija, generiranje novih sigurnijih lozinki, te omogućuje šifriranje raznih računa na temelju biometrike, tipa otiska prstiju, skena zjenice i slično.

Nedostatak kao i kod aplikacije *LastPass* je taj da se plaća, no za nekakve najosnovnije funkcionalnosti nije potrebno izdvojiti novac, već se može besplatno koristiti.

# Korištene tehnologije

U sljedećem poglavlju ćemo ukratko opisati tehnologije koje smo koristili prilikom izrade PassLock aplikacije, kao i reći nešto više o samom algoritmu SHA256, koji je korišten pri kriptiranju lozinki.

## 3.1 Visual Studio 2017 (C#, .NET Framework)

![Slika na kojoj se prikazuje isječak crteža

Opis je automatski generiran](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4R1uRXhpZgAATU0AKgAAAAgABgALAAIAAAAmAAAIYgESAAMAAAABAAEAAAExAAIAAAAmAAAIiAEyAAIAAAAUAAAIrodpAAQAAAABAAAIwuocAAcAAAgMAAAAVgAAEUYc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAFdpbmRvd3MgUGhvdG8gRWRpdG9yIDEwLjAuMTAwMTEuMTYzODQAV2luZG93cyBQaG90byBFZGl0b3IgMTAuMC4xMDAxMS4xNjM4NAAyMDE4OjEyOjA1IDE2OjA1OjUzAAAGkAMAAgAAABQAABEckAQAAgAAABQAABEwkpEAAgAAAAMyMgAAkpIAAgAAAAMyMgAAoAEAAwAAAAEAAQAA6hwABwAACAwAAAkQAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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R6RZ+N/FMi+KZp764vVWyndTJLdSOCCFIA+bjBIx3r84gB0YZHXj1/lj2pfl3EsitkrnqOgxgYPHPNP+yaDp8jbbve/UX9mUXDlbd+/U2fG2qQa34z1/UbV/MtbvULi4ifBG5HkZlOCARwR1FW/h78Qta+GHiyx8R6BdNaalaupLD7skY6ow9/WuaXgAUV6/JHl5Htseryrl5XsfqT8Kf2/vhv4+0hLfxYw8KarIojuIb5d9vMcYJDY5UnPUdK0tW8U/sp2JOq3jfD+5mY+Y32a3t7iTJ5OVVCwPsea/KXgtkqp4xnGT+tIu5RgOwHbBrwpZNRTvTm4p9Dx5ZTS5rwk0ux9t/tFft1aRfeHZvBXwosv7J0Ur5Nzq8EH2fFuGwUgjAG0Efxeh6CvSrr9s34S3H7PUvhJPEcg1qTwuNL8hrSY7ZTa+UQWC4OCT9cV+be4leSSdpUn15odmbcM4B9GcEfiGrpeVYfljFX0d79/XQ2eW0eWMV019Rsbbo1PqM9/wCoB/Svur9iP9qj4cfBX4Q3uieLNcNhqEuqy3SRrayvlWWNAMhcf8s859/bn4XJySefxOaNzA8HI9GZz+XzcV24nDQxVP2c3odWIw8cTD2cnod78evFWmeOfjR4x17R7g3Ol6hqUs1vMVK71YnBweRx61xmj6teeHtUtNU0y4kstRtpBJHcRnDDHb6VTwfmIOH2kA+mTnNOOMnAwOwreMVGPIttjojFRiodD9C/gZ/wUc0afSrfSfiXay6dexqEOrWaebbzLjAZ0HKsep5PJPAr1q78ZfsweMh/aN7c+CL2Sb98ZbiGNHYtzlsgHJzzmvyYC/KwyQSc5T5fzx1pTht25VYk55jU/wBOa8WplNGUuam3G/b+v1PInldKUuaDcfQ/VDVf2s/gJ8FNMuE8LPp11c7cLaeHbTJkxwFLAYH15r4X/aM/ai8R/tB6xF56No/huzYtZaOpztz/ABSnA3Nj2GDXiwU7cMFIHQKCv8jS104bLqOHl7TWUu7OjD4Cjh5c6u33YrYycAgdsnJ/Okoor1D0QooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAWNmjcMrlW3BxtONjD7rL/db371+hn7Fn7aqa5/Z3gHx9equpACDS9WlbAnCgKI3OOGAH3s8nsK/PKnRsY5EYMylWDgodrKw6Mp7H+dcWLwsMXT5JfJnJicNDFQ5Jn7zat4m03w7psl9q17b6bZRDL3NzKEjGPc4zXzD8Wv+CiXw98FrPa+GUm8Z6nGWXdbZjs0YEj5pSOcewP1r82PFHxG8UeNktV8Qa/qGsLaxrFCl1OzoiqMDC5x0Fc6zM+CWyR/e6fXHTP4V41DJKcda8r+SPJo5PCOtWV/Q97+KX7bfxO+KErR/wBrDw/pLNkWWkfJlSMbWkOS31wPpXgjMzMWd2kc8l3OWY+pPc0Hk9Sfc4/pSV9BSo06MeWmrI9ynShRXLBWCiiitjUKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAP//Z) Integrirano razvojno okruženje Visual Studio, kreativna je platforma koja se može koristiti za uređivanje, ispravljanje i izgradnju koda, a zatim i objavljivanje aplikacije, izrađena od strane Microsofta. Visual Studio je bogat program koji se može koristiti za mnoge aspekte razvoja softvera.

Slika 4. Microsoft Visual Studio

Osim standardnog urednika i debuggera koji većina IDE-ova pruža, Visual Studio uključuje kompajlere, alate za dovršavanje koda, grafičke dizajnere i još mnogo toga za olakšavanje procesa razvoja softvera. Neke od važnih značajki koje nudi su:

* **Refactoring** – *uključuje operacije kao što je inteligentno preimenovanje varijabli, vađenje jedne ili više linija koda u novu metodu, promjene redoslijeda parametara metode i još mnogo toga.*
* **IntelliSense** – *pojam za skup značajki koje prikazuju informacije o vašem kodu izavno u uređivaču i, u nekim slučajevima, za vas piše i male dijelove koda.*
* **Quick Actions** – *značajka koja podcrtava potencijalne probleme koje možete riješiti odmah, bez čekanja da se pogreška otkrije tijekom builda ili dok program već radi.*
* **Call Hierarchy** – *značajka koja prikazuje metode koje pozivaju odabranu metodu, može biti jako korisno kada razmišljate o izmjeni ili uklanjanju metode, ili kada pokušavate pronaći potencijalnu grešku.*
* **Code Lens** – *značajka koja vam pomaže da pronađete reference na svoj kod, promjene u kodu, povezane greške, radnje stavke, recenziju koda i testove jedinica, sve bez napuštanja urednika.*
* **Peek Definition** – *značajka koja vam prikazuje definiciju metode ili tipa podataka, bez potrebe da otvarate zasebne datoteke.*

## 3.2 SQLite

SQLite je sustav za upravljanje bazom, sustav kojem nije potreban nikakav server, te sustav koji je vrlo lagan sa sam hardver. SQLite baza je pohranjena u jednoj jedinoj konačnoj datoteci s ekstenzijom .db ili -sqlite, te se u njoj nalazi cjelokupna struktura tablica te podataka koje su u nju pohranjene. Takva datoteka se lako prenosi, lako se njome upravlja i dijeli, te je podržana od velikog broja aplikacija. Osim toga, tu jednu datoteku je moguće zaključati tako da samo određene osobe imaju pristup njoj što je vrlo korisno za naš projekt.

SQLite je pogodan za sustave slabijih performansi, budući da ne koristi nikakve komplicirane algoritme pretraživanja ili obrade podataka, tako da je pogodan za mobilne uređaje, pametne satove i razne druge uređaje.

Slika 5. SQLite

SQLite je također open source projekt, gdje je moguće sudjelovati u razvoju istog ili pak iskoristiti postojeće tehnologije kako bi se izradio neki drugi, bolji sustav.

## 3.3 SHA256 hash algoritam

SHA256 je set kriptografskih hash funkcija koja je dizajnirana u Sjedinjenim Američkim državama od strane Nacionalne Siguronosne Agencije (NSA). Funkcije su sagrađene korištenjem Merkle-Damgard strukture…

SHA256 je jedan od algoritama iz obitelji SHA2, te još postoje sljedeći algoritmi: SHA-224, SHA-384, SHA-512, SHA-512/224, SHA-512/256. Pojedini brojevi u nazivu odgovaraju broju bitova koji se koristi, tako da je SHA256 zapravo 256 bitni algoritam.

Krajnji rezultat hash-iranja nekog nizova znakova rezultira u hash-u koji sadržava 64 alfanumeričkih znakova, gdje su slova isključivo mala.

Sam algoritam ima veliku primjenu, tako se on koristi kod tehnologija poput TLS,SSL, SSH i nekih drugih. Također se koristi kod hash-iranja Debian paketa ili čak hash-iranja Bitcoin transakcija kako se te transakcije mogle sačuvat i koristiti kao dokazni materijal.

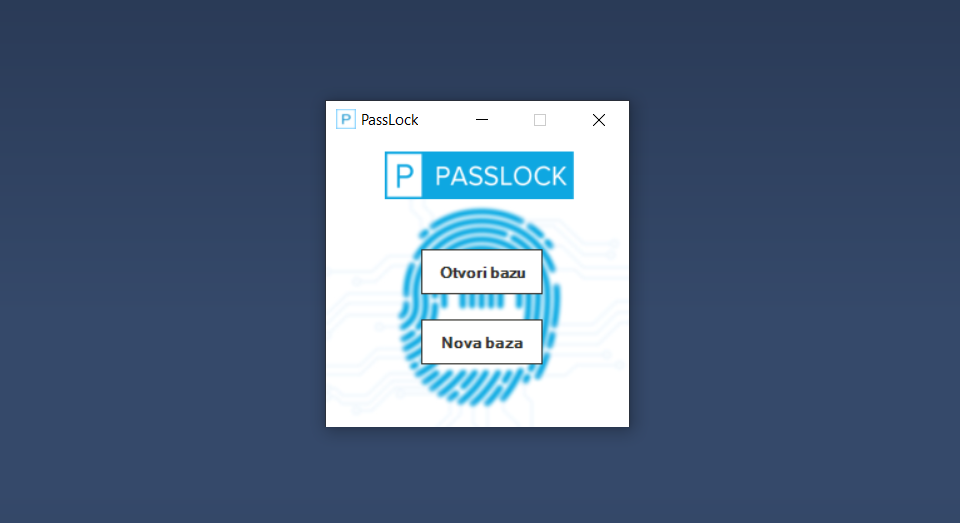
Primjer kriptiranja praznog znaka ili razmaka:



# PassLock aplikacija

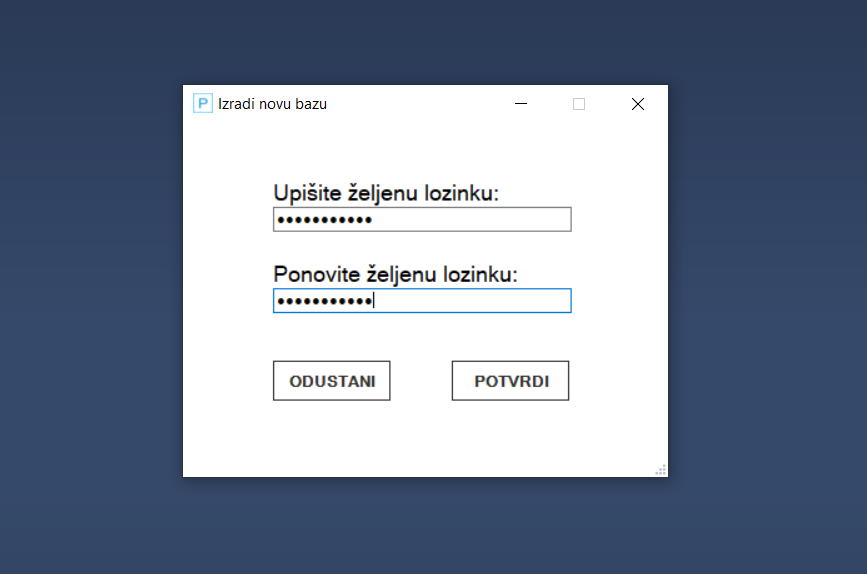
Nakon što ste preuzeli aplikaciju, prije nego što ju počnete koristiti potrebno ju je instalirati na vaše računalo. Nakon što ste instalaciju izvršili dva puta kliknete na izrađenu ikonu aplikacije te vam se ona otvara.

1. Početni zaslon koji vam se otvori je prikazan na slici ispod, te on nudi dvije mogućnosti. Otvaranje već postojeće baze ili stvaranje nove.

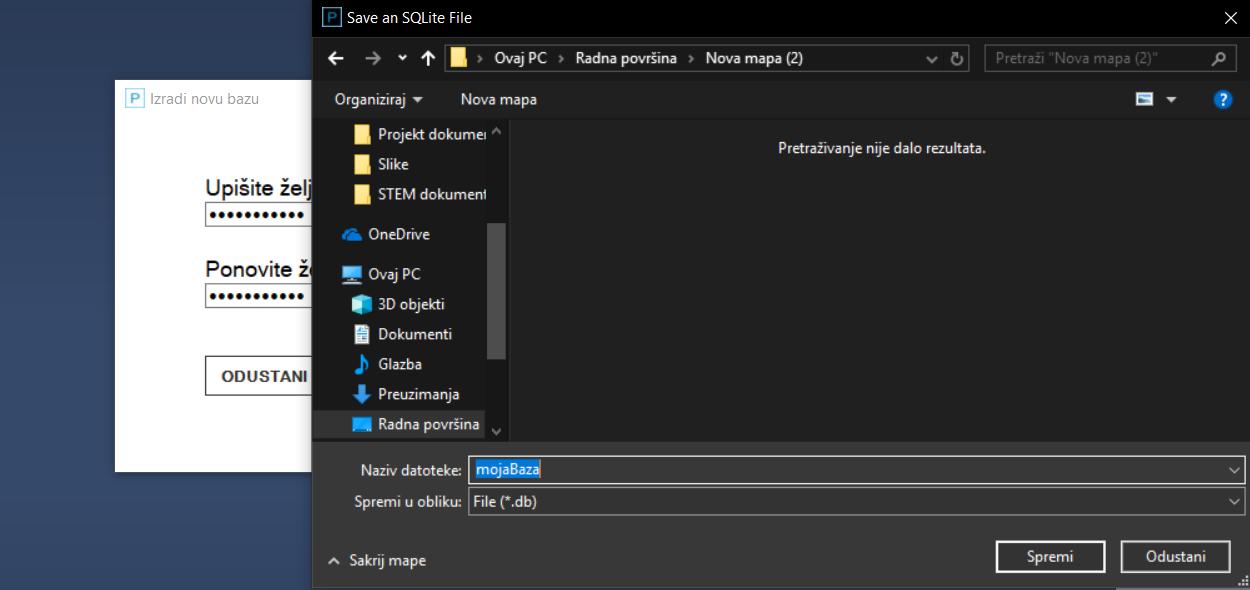


Slika 6. PassLock – početni prozor

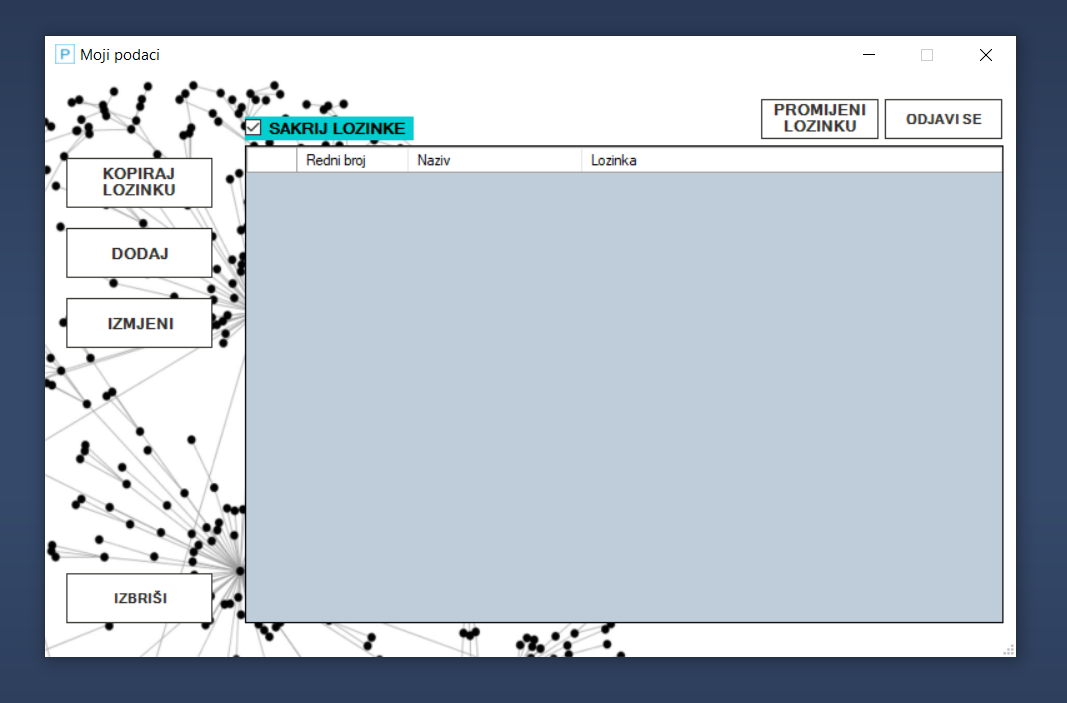
1. U slučaju da nemamo već kreiranu bazu onda odabiremo drugu opciju, *Nova baza*, čime nam se otvara prozor s slike ispod, a u njega unosimo šifru pomoću koje kriptiramo našu bazu. Iza te lozinke će se nalaziti sve naše ostale lozinke pa je potrebno odabrati dobru i čvrstu lozinku. Softverski je određeno da lozinka ne može imati manje od 8 alfanumeričkih znakova. Zatim kliknemo *POTVRDI.*

Slika 7. PassLock – izrada nove baze

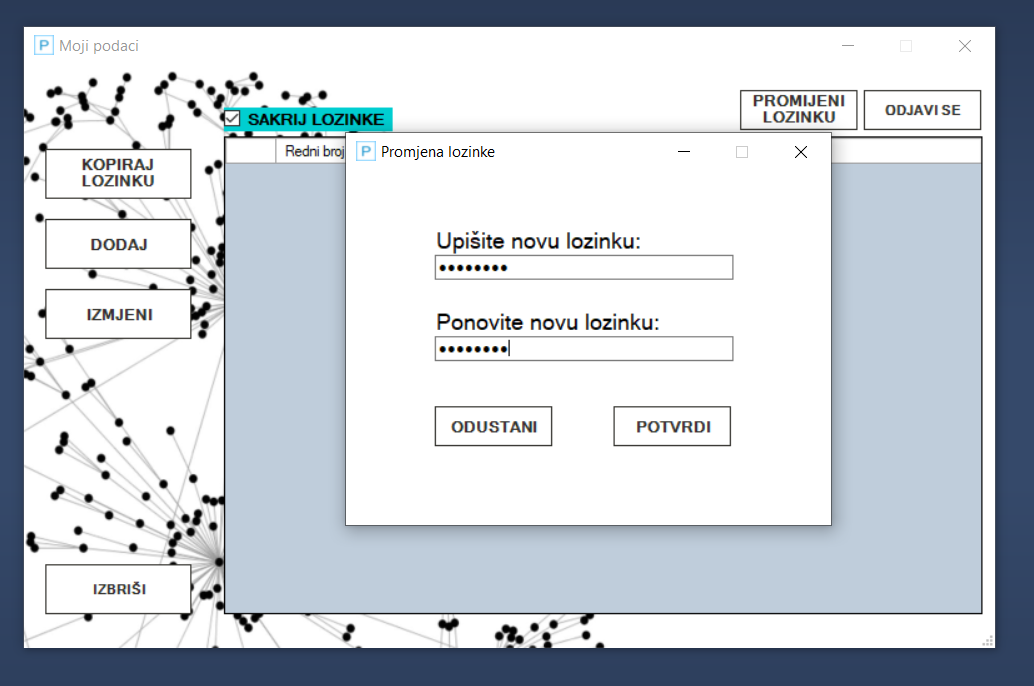
1. Nakon što smo odabrali lozinku, potrebno je još odrediti naziv naše baze i lokacija gdje će se baza kreirati koje je prikazano na slici ispod, a zatim kliknemo *Spremi.*



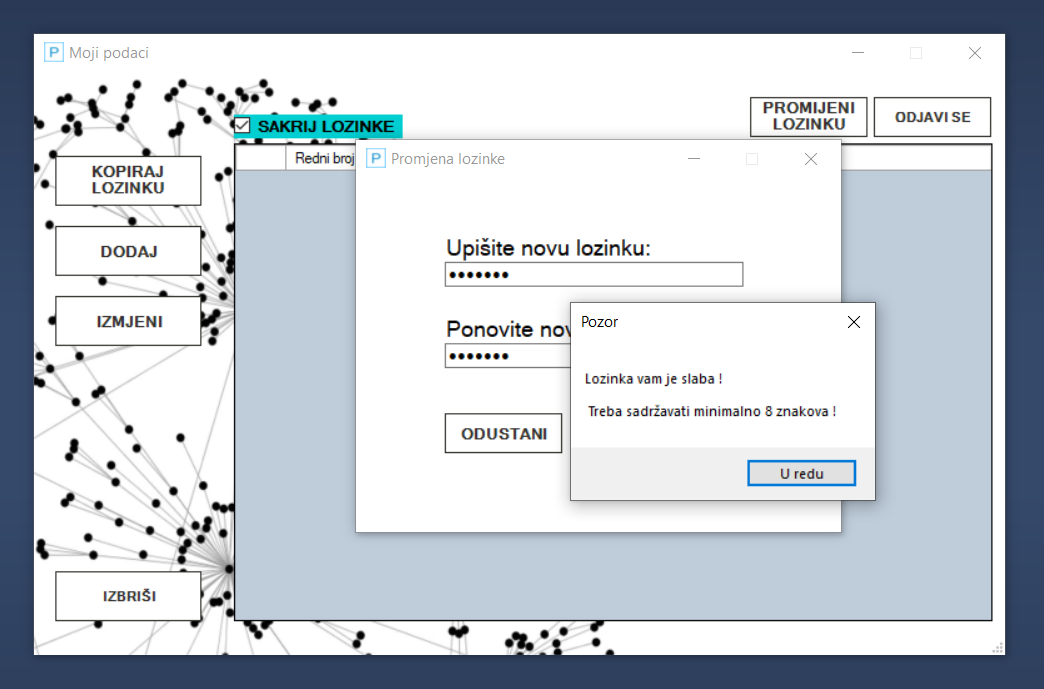
Slika 8. PassLock – spremanje baze pod željenim imenom

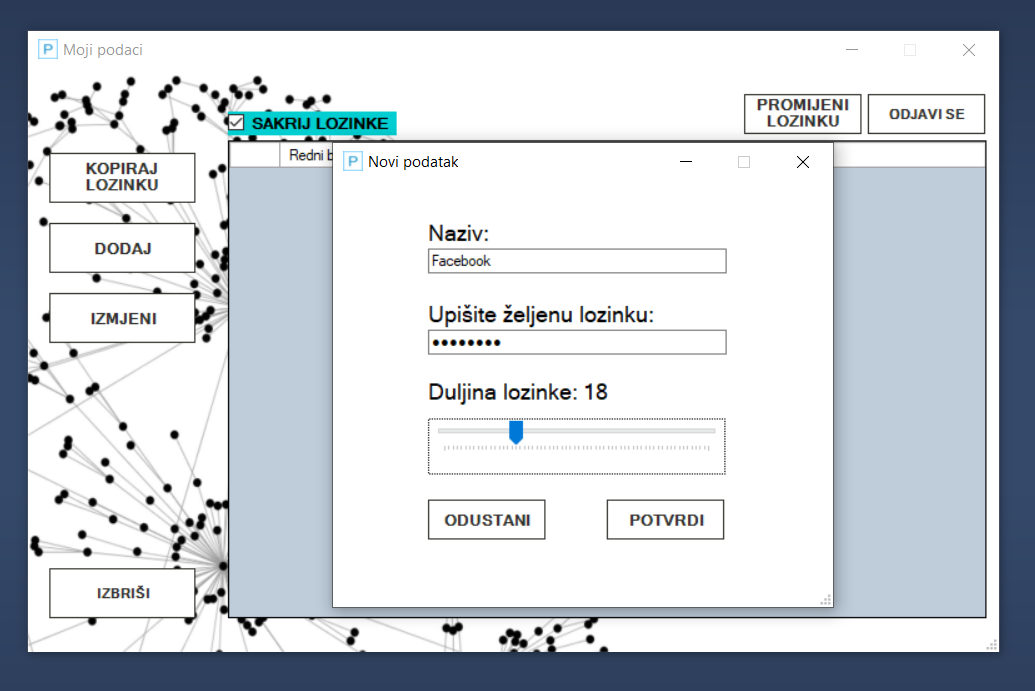
1. Ovime smo kreirali bazu te se sada otvara glavni prozor, *Moji podaci*, od kuda se vrše sve ostale aktivnosti.

Slika 9. PassLock – glavni zaslon

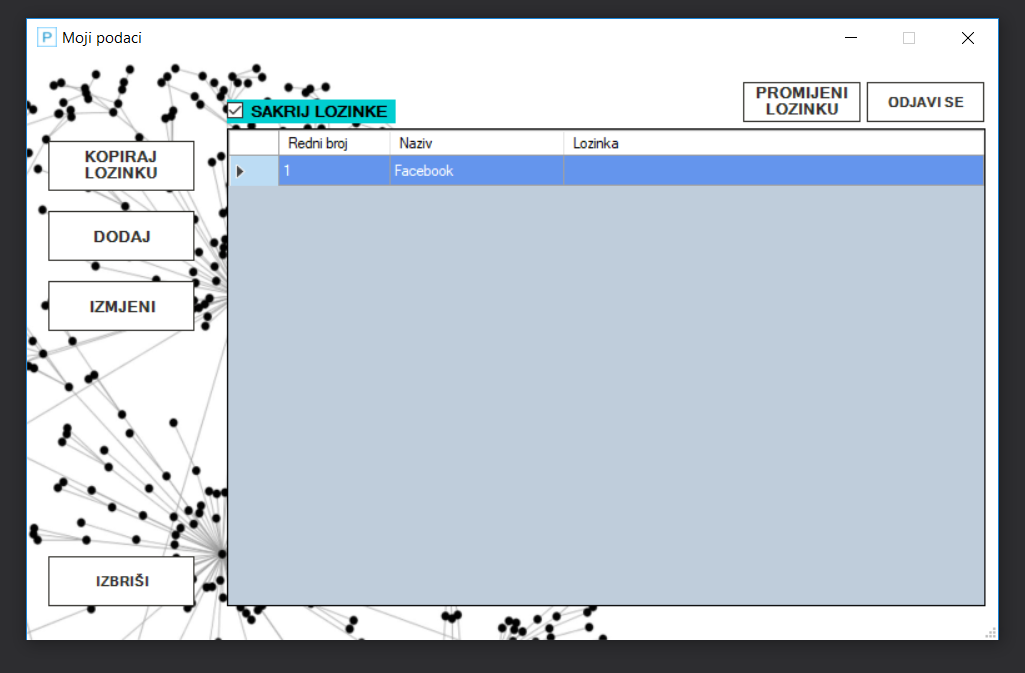
1. U slučaju da nam se ne sviđa lozinka baze ili ako je netko otkrio lozinku, uvijek onu možemo promijeniti. Kako bi to napravili odaberemo gore u desnom dijelu prozora *PROMIJENI LOZINKU* čime se otvara novi zaslon gdje izvršimo promjenu lozinke. Nova lozinka mora sadržavati minimalno 8 znakova te se korisnika obavijesti o tome ako ona ne ispunjava naveden zahtjev.

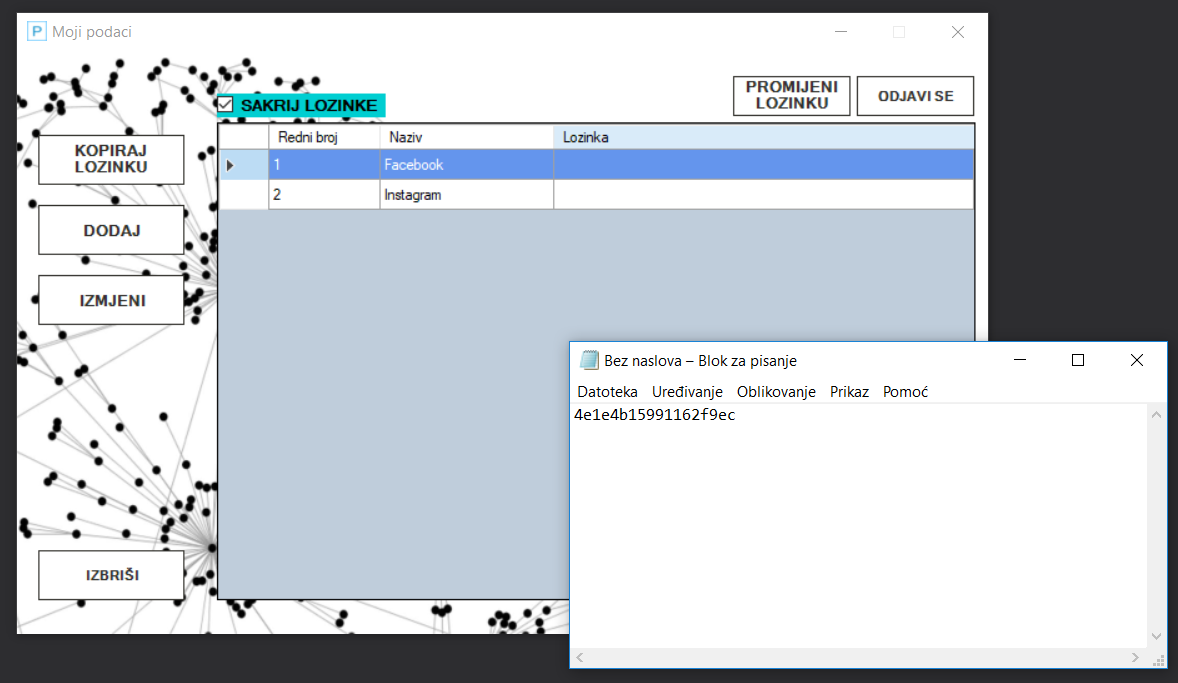
Slika 10. PassLock – promjena glavne lozinke

Slika 11. Neuspješna promjena glavne lozinke

1. Kako bi aplikacija imala smisla, u bazu je potrebno dodati račune odnosno lozinke. Tu aktivnost vršimo s pritiskom na *DODAJ* čime se otvara sljedeći prozor:

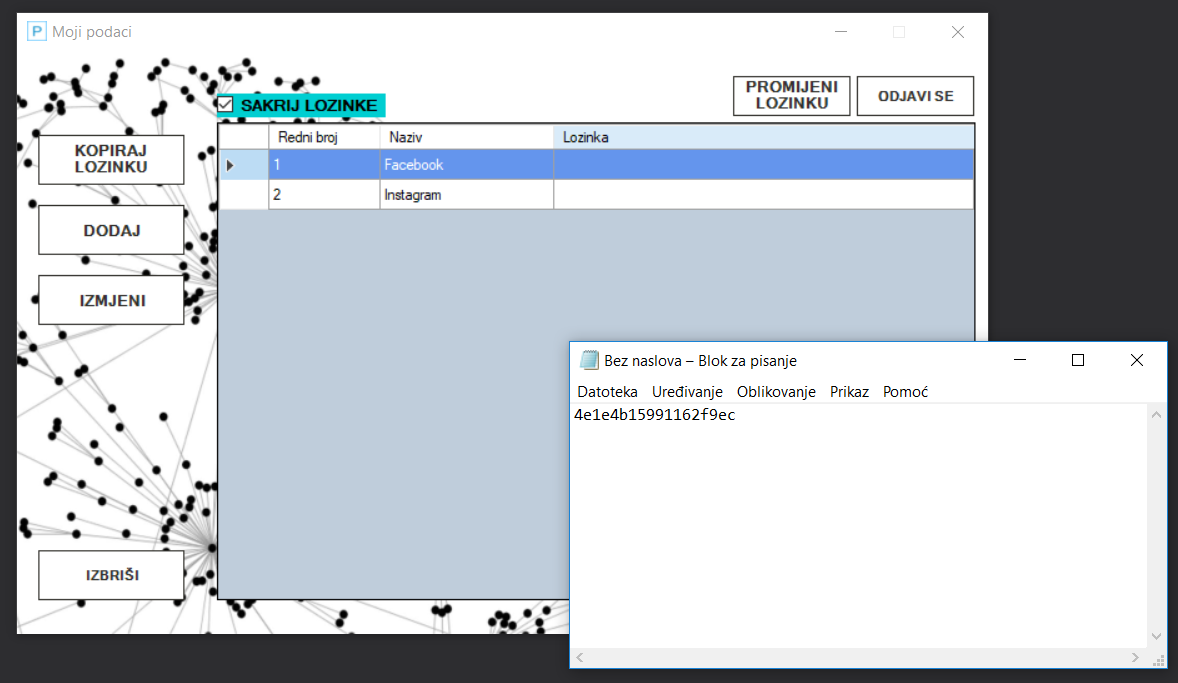
Slika 12. PassLock – dodavanje nove lozinke u bazu

Unutar prozora *Novi podatak* unosimo naziv aplikacije/računa iza kojeg stoji naša pohranjena lozinka, zatim se upisuje lozinka koja se kasnije kriptira i pohranjuje u bazu, a na kraju možemo odabrat duljinu (od 1 do 64 znaka) novogenerirane lozinke. Prilikom pritiska na *POTVRDI* generirana lozinka se pohranjuje u bazu.

Slika 13. PassLock – Dodana nova lozinka

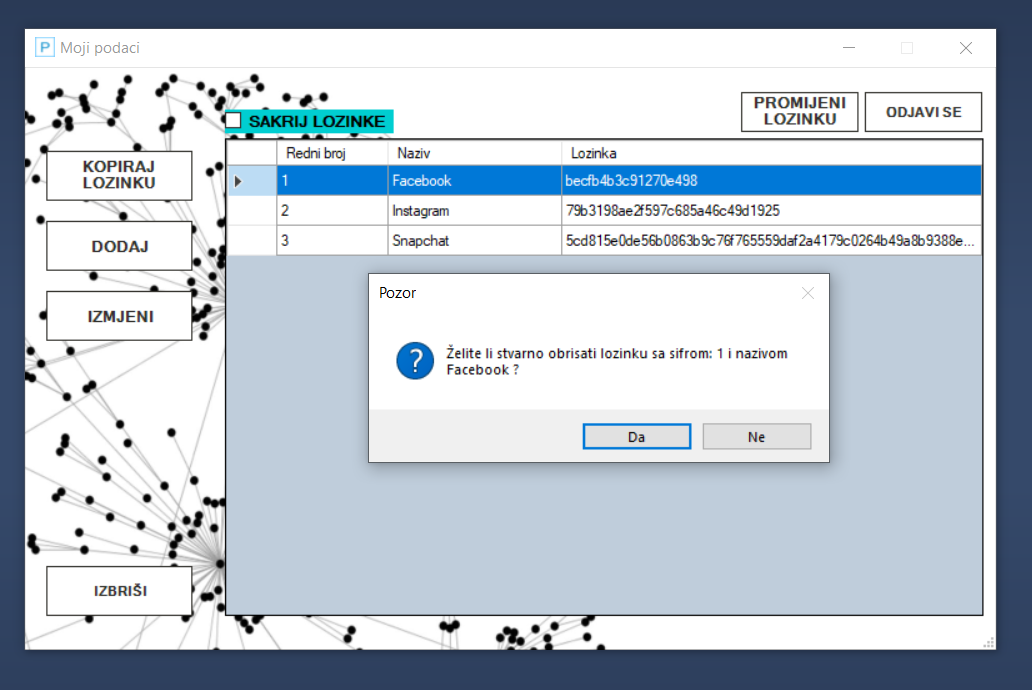
Slika 14. PassLock – kopiranje u *Clipboard* (međuspremnik)

Kako bi se kriptirana lozinka lakše koristila, nju je moguće pohraniti u *Clipboard* , a to se ostvari pritiskom na gumb *KOPIRAJ LOZINKU* te je nju sada potreno zaljepiti na određeno mjesto. Također možemo primijetiti da je nenaznačena lozinka skrivena. Takvo nešto postižemo na način da odaberemo *SAKRIJ LOZINKE* opciju, te će tada biti skrivene sve lozinke koje nisu označene.

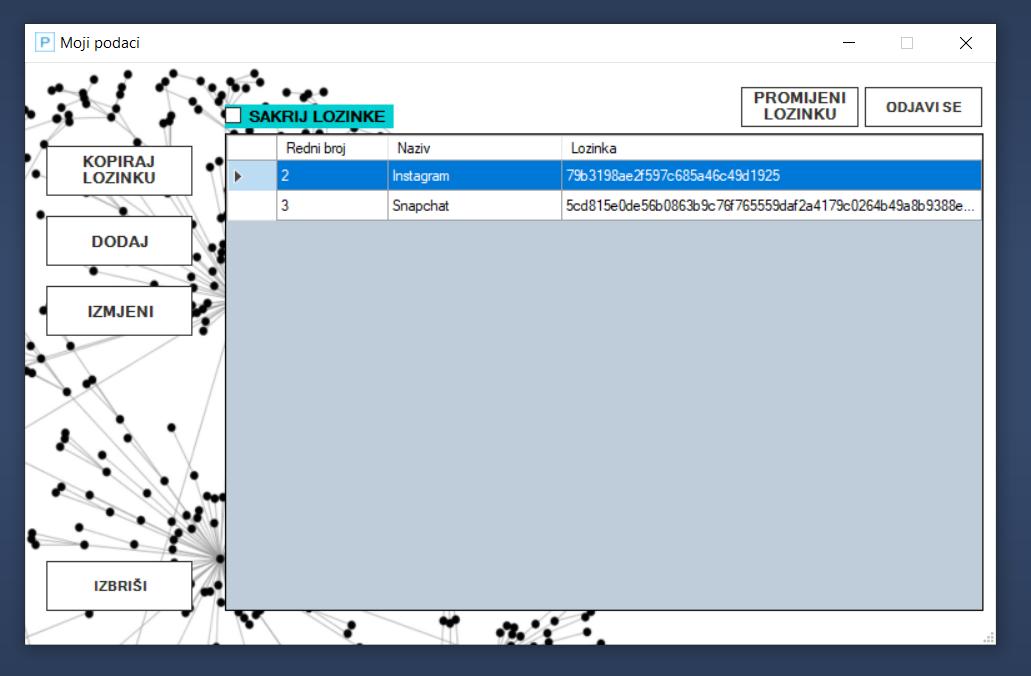
1. Uslučaju da nam lozinka neodgovara iz nekoih razloga ili da nam se ne sviđa, lozinku uvijek možemo urediti. Iz tablice lozinki odaberemo onu koju želimo urediti te kliknemo na gumb *IZMJENI* čime se otvara prozor sa sljedeće slike.

Slika 15. PassLock – izmjena lozinke

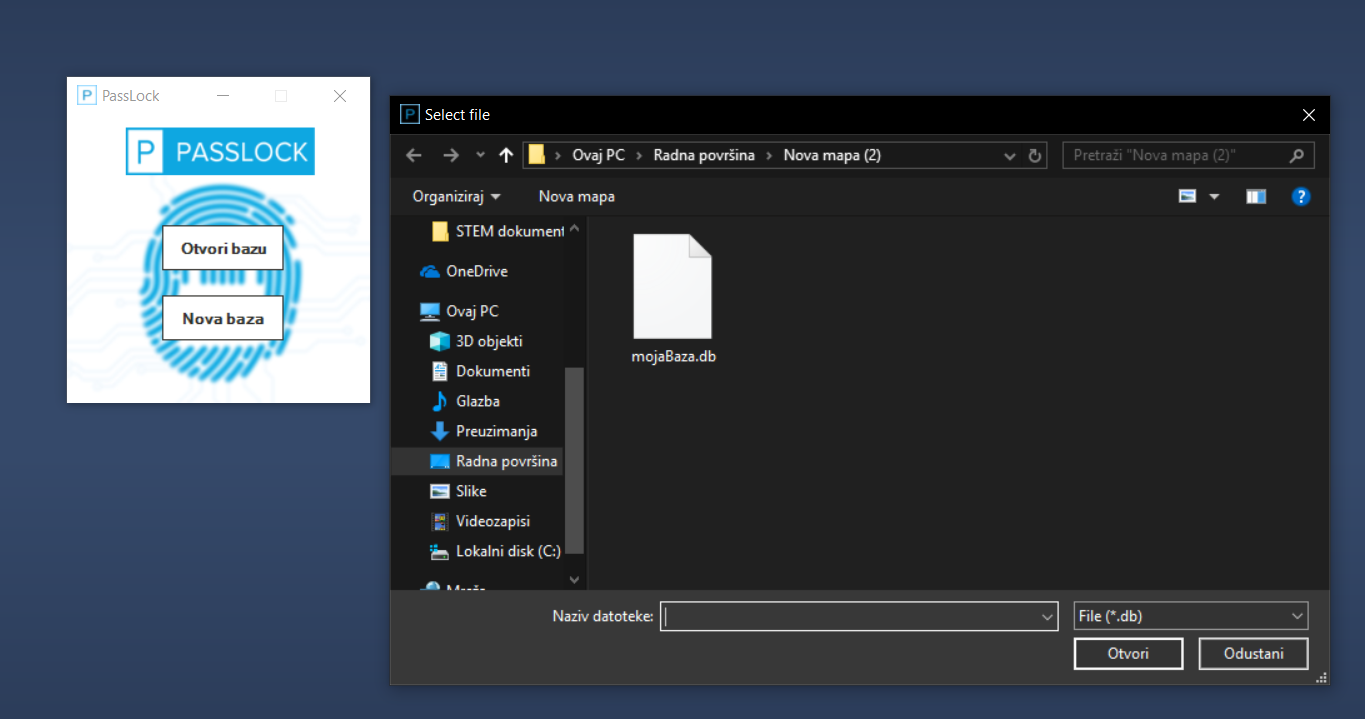
U prozoru *Izmjeni podatak*, možemo naziv računa promijeniti, upisati odnosno urediti postojeću lozinku, a ako odaberemo opciju Enkriptiraj SHA256, upisana lozinka će se ponovo kriptirati. Pritisnemo *POTVRDI* te se nova lozinka pohranila u bazu.

1. U slučaju da nam neka lozinka više nije potrebna, tada nju možemo izbrisati iz popisa, odnosno iz baze. Kako bi to izveli jednostavno u popisu odaberemo tu lozinku te pritisnemo *IZBRIŠI*  čime nas aplikacija pita jesmo li sigurni da želimo to učiniti, a kako bi to potvrdili odaberemo *Da.* Time je lozinka izbrisana iz baze.

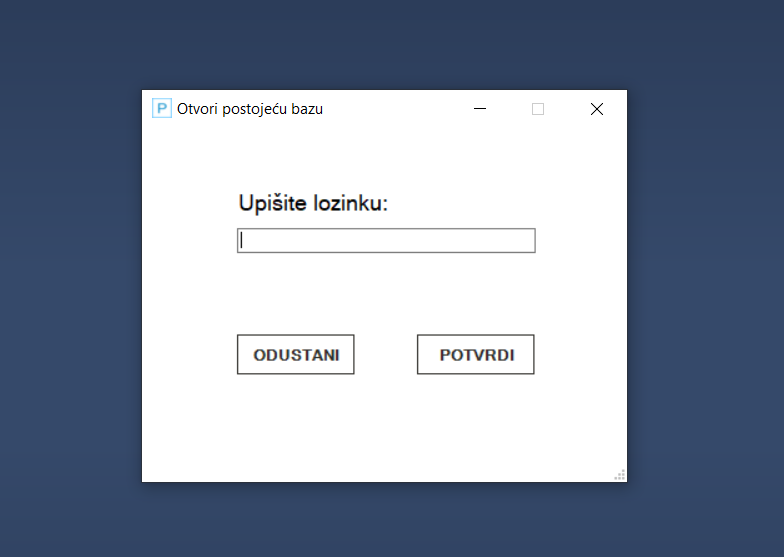
Slika 16. PassLock – brisanje lozinke

 Osim toga, možemo vidjeti da sada nije označena opcija *SAKRIJ LOZINKE* te su u tom slučaju sve lozinke iz same baze vidljive korisniku, ali i svima drugima koji se nalaze u istoj prostoriji što svakako povećava rizik od krađe podataka putem ***shoulder surfinga****.*

Slika 17. PassLock – obrisana lozinka

1. U slučaju da smo obavili u bazi ono što smo htjeli, potrebno se odjaviti iz baze, a to se obavi jednostavnim pritiskom na gumb *ODJAVI SE* čime dolazimo opet na početni prozor
2. Sada kad imamo našu bazu, njoj možemo pristupiti iz glavnog prozora pritiskom na *OTVORI BAZU.* Pritiskom na gumb otvara se prozor s slike ispod te u njemu pronalazimo i odabiremo našu kriptiranu bazu, a zatim kliknemo *Otvori.*

Slika 18. PassLock – otvaranje postojeće baze

Ovim se otvara novi prozor u koji je potrebno unijeti lozinku zaključane baze, a nakon ispravnog upisa odaberemo *POTVRDI* čime prelazimo na novi zaslon, *MOJI PODACI.*

Slika 19. PassLock – ulazak u postojeću bazu

# Zaključak

Kreiranje PassLock aplikacije je bilo vrlo zanimljivo i korisno, budući da smo naučili kako se koristi SHA256 kriptografija u Visual Studio-u te smo tu istu kriptografiju primijenili u praksi gdje možemo takav tip aplikacije koristiti u osobne.

U sam projekt bi jedino dodali spremanje podataka u neku vanjsku bazu (Cloud) kako to rade profesionalna poduzeća, no to zahtjeva dodatne resurse i sa sobom nosi nove rizike kao što su npr. rušenje servera, hakiranje i slično. U ovakvom slučaju su podaci kod nas u privatnom vlasništvu te samo mi imamo pristup njima.

Kako bi imali pristup svojim podacima bilo gdje i bilo kada potrebno je bazu podataka postaviti na USB ili drugi prijenosni medij te onda možemo pristupiti lozinkama s nekog drugog radnog mjesta, također svi podaci su zaštićeni od *shoulder surfinga*.

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