Car Recommendation Engine

Agenda

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2. Business Problem
3. Solution
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5. Pain Points
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7. ERD & Table Creation
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9. Business Value & Benefits
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Company Overview

01

Founded in 2012, Carvana is an online used car buying service.

Mission:

"To change the way people buy cars by providing our customers a car-buying solution that is fun, fast, fair, and powered by technology."

Business Problem

02

- Massive industry - difficult to carve out market share
- Americans buy ≈ 40 million used cars a year - extremely competitive space
- No brick and mortar - no dedicated sales reps

Solution

03

Develop robust recommendation engine that:

- Delivers personalized marketing
- Educates/engages customers in selection process
- Drives increase in revenue, inventory turnover, conversion rate, and market share

Amazon Case Study

35%

Of Amazon's revenue is generated through the recommendation system.[1]

Data

59%

Of shoppers say recommendations had "noticeable influence on purchasing.[2]"

Netflix Case Study

$1B

"the combined effect of personalization and recommendations save us more than $1B per year.[3]"

[1] https://www.mckinsey.com/industries/retail/our-insights/how-retailers-can-keep-up-with-consumers
[2] https://www.infosys.com/newsroom/press-releases/Documents/genome-research-report.pdf
[3] https://dl.acm.org/doi/pdf/10.1145/2843948?download=true

Current Process

04

Customer visits cavana.com

Customer engages with site, discovers brand, and develops interest in purchasing a vehicle.

Searches inventory

Customer manually searches inventory - filtering on a combination of price, make/model, year, mileage, body type, color, features, etc.

Selects vehicle

After searching inventory, customer identifies a vehicle that fits their needs.

Creates account

Customer goes through carvana account creation process - filling out personal information and agreeing to credit check.

Purchases selected vehicle

Once account is created, customer selects purchasing method (financing or payment in full) and pays.

Pain Points

05

Challenges with the current process include:

01 | No personalized marketing - must search site manually

02 | Customers must research vehicles externally

03 | Search can only be filtered by technical specifications

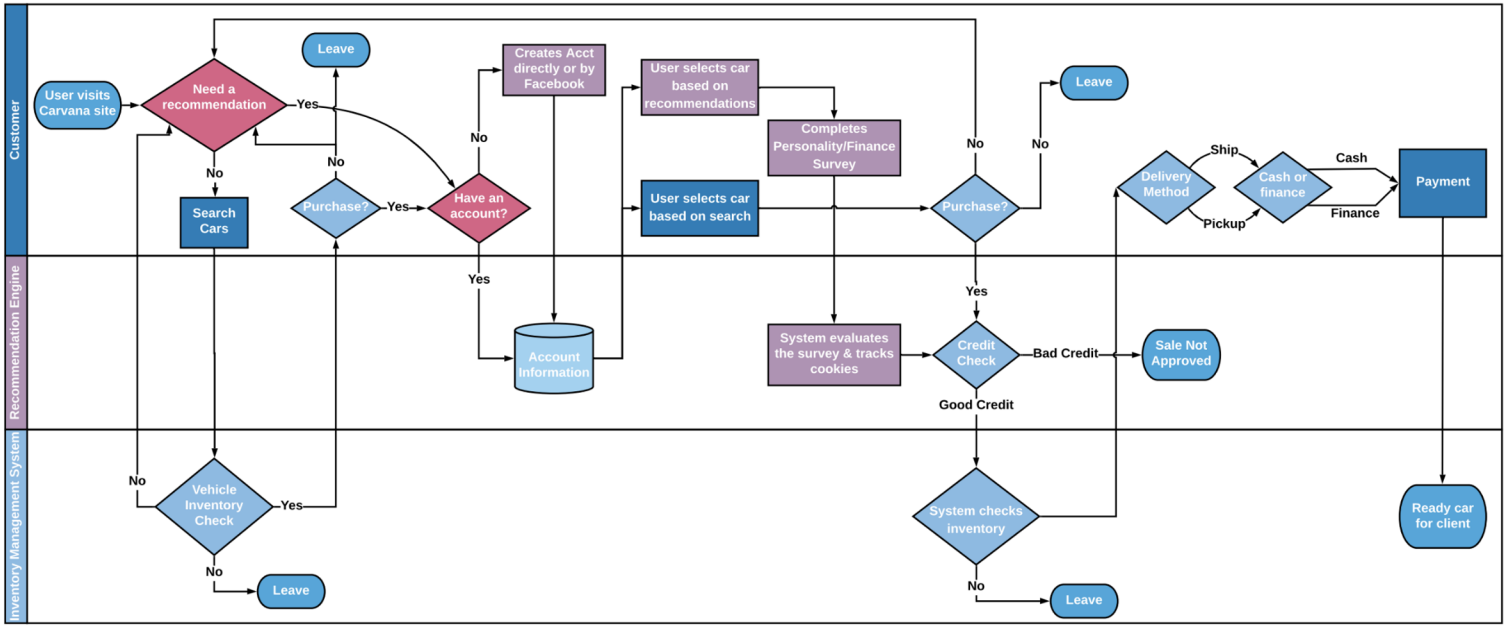
04 | Poor conversion rate (2%)

05 | Excessive “Basket-to-Purchase” time

06 | Little data collected on customers

TO-BE & Gap Analysis

06



ERD & Table Creation

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Overview of Tables:

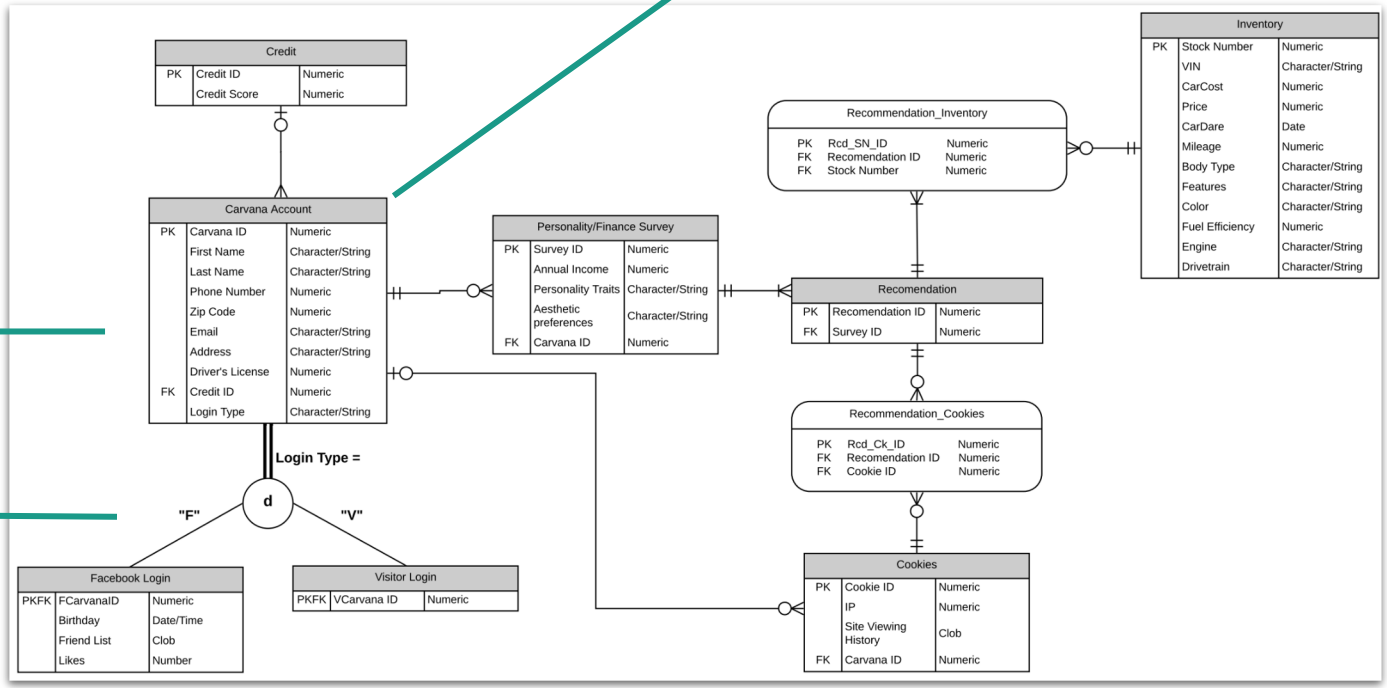
	CARVANAID	FIRSTNAME	LASTNAME	PHONENUMBER	ZIPCODE	EMAIL	ADDRESS	DRIVERLICENSE	LOGINTYPE	CREDITID
1	1120345	Jared	Bergantino	3419426780	6207	jared@gmail.com	36 Park St Hartford CT	18249507	Visitor	323
2	3302506	Li	Guo	4628095712	6001	li@gmail.com	4 Main St Avon CT	19503628	Visitor	861
3	8606313	Ziyi	Zhao	8365965295	6032	ziyi@gmail.com	63 Mulberry Ave New York NY	10462759	Visitor	923
4	1947553	Wang	Fang	9205718593	6067	wang@gmail.com	947 Fifth St Denver CO	19567386	Visitor	5843
5	8604934	Stephen	King	7693046271	6093	stephen@gmail.com	3 South St Des Moines IA	39576345	Facebook	6211
6	6491739	Ai	Weiwei	5463728609	6081	ai@gmail.com	573 Wild Blvd Helena MT	97653946	Facebook	9848
7	418561	Fan	Bingbing	8796045295	6069	fan@gmail.com	45 Bridge Rd Tallahassee FL	28594638	Facebook	5272
8	7664821	Melinda	Gates	2849609874	6011	melinda@gmail.com	3 Q Ave Atlanta GA	20564839	Facebook	6890
9	3925967	Phillis	Wheatley	1748597746	6072	phillis@gmail.com	1039 Red Rd Bismark ND	37562857	Facebook	5323
10	7557293	Bob	Dylan	8327894624	6019	bob@gmail.com	643 Holly Dr Las Vegas NV	30572967	Facebook	6210

Table Creation Example::

```
CREATE TABLE CarvanaAccount(
CarvanaID number(20) primary key,
FirstName varchar(20),
LastName varchar(20),
PhoneNumber number(20),
ZipCode number(10),
Email varchar(255),
Address varchar(200),
DriverLicense number(20),
LoginType varchar(10),
CreditID number(20),
constraint fk_CarvanaAccount foreign key
(CreditID) references Credit(CreditID));

CREATE TABLE FacebookLogin(
FCarvanaID number(20) primary key,
constraint fk_FacebookLogin foreign key
(FCarvanaID) references CarvanaAccount(CarvanaID),
Birthday date,
FriendList clob,
Likes number);

CREATE TABLE VisitorLogin(
VCarvanaID number(20) primary key,
constraint fk_VisitorLogin foreign key
(VCarvanaID) references CarvanaAccount(CarvanaID));
```



Live Demo of Reports

08

01

```
SELECT a.CarvanaID "Carvana ID", a.Last Name
"Last Name", a.FirstName "First Name",
EXTRACT(YEAR FROM i.caryear)||' '||i.Make||'
'||i.CarModel "Recommendation"
FROM CarvanaAccount a JOIN
PersonalityOrFinanceSurvey s ON a.CarvanaID =
s.CarvanaID JOIN Recommendation r ON
s.SurveyID = r.SurveyID JOIN
Recommendation_Inventory ri ON
r.RecommendationID = ri.RecommendationID JOIN
Inventory i ON ri.StockNumber = i.StockNumber
ORDER BY 2;
```

Car Recommendation

Displays what vehicles in Carvana's inventory match each respective customer's preferences.

Carvana ID	Last Name	First Name	Recommendation
1120345	Bergantino	Jared	1986 Mazda 323
418561	Bingbing	Fan	2001 Volkswagen Jetta
7557293	Dylan	Bob	2005 Toyota Highlander
1947553	Fang	Wang	1990 Acura Integra
7664821	Gates	Melinda	2012 Honda CR-V
3302506	Guo	Li	1996 Mercedes Benz S Class

Credit Check

Checks whether or not customers are eligible to purchase vehicle based on credit score.

Carvana ID	Customer Name	Credit Check
418561	Fan Bingbing	Approved
1120345	Jared Bergantino	Approved
3302506	Li Guo	Approved
1947553	Wang Fang	Approved
6491739	Ai Weiwei	Not Approved

02

```
SELECT a.carvanaid "Carvana ID",
a.firstname||' '||a.lastname
"Customer Name",CASE WHEN
(c.creditscore > 670) THEN 'Approved'
ELSE 'Not Approved' END "Credit
Check"
FROM Credit c JOIN CarvanaAccount a
ON c.CreditID = a.CreditID
ORDER BY 3,2;
```

03

```
SELECT f.likes, a.FirstName,
s.AestheticPreferences,
s.PersonalityTraits
FROM facebooklogin f JOIN
CarvanaAccount a on f.FCarvanaID =
a.CarvanaID JOIN
personalityorfinancesurvey s on
a.CarvanaID = s.CarvanaID
ORDER BY 1;
```

Customer Preferences

Shows the relationship between the customer's number of likes on Facebook, personality traits and aesthetic preferences.

LIKES	FIRSTNAME	AESTHETICPREFERENCES	PERSONALITYTRAITS
123	Stephen	Silver	Practical
442	Bob	Brown	thrifty
2232	Phillis	Black	mystery
3232	Ai	Gold	humourous
33232	Melinda	Blue	optimistic
43434	Fan	White	honesty

Business Value & Benefits

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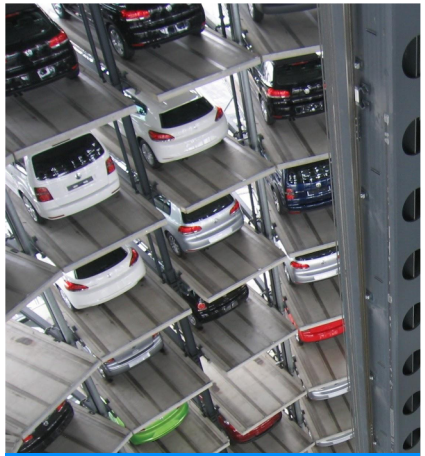
Inventory Turnover	1.4% → 2.0%
Conversion Rate	2.0% → 5.0%
Market Share	0.4% → 1.0%



CUSTOMER-FOCUSED

Recommendation engine will simplify the car buying process for all potential consumers.

Conclusion

Company AS IS → TO BE

1. Business background & problem
2. Current process & pain point
3. To be & gap analysis

Business values - Customer

1. More efficient process
2. Better purchasing experience
3. Higher satisfaction

Business values - Market share

1. Higher competitiveness
2. Higher market share
3. Become market giant

ERD & SQL

1. Created ERD and created tables using SQL
2. generated reports and find data insights

Business values - Profitability

1. Higher conversion rate
2. Higher inventory turnover
3. Higher profitability

Thank you.