



Practice Session # 1

This practice session aims to design databases, which keeps track of “user experience”.¹

Web as Data Source for Business

Web Analytics

Web analytics is a way of learning how users interact with websites and mobile apps.

Web analytics tools record pages a user views, when he or she views it, and in what order, returning useful information.

1. Web analytics tools stitch together the story of how each user moves through a website.
2. They capture how a user got to a website, such as by doing a **search in a search engine** or following a link **from another website**.
3. **Web analytics tools are mainly used for online marketing**, to introduce company’s brand to people and enticing them to become customers.

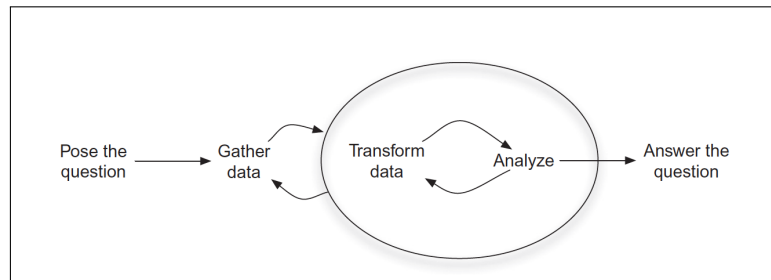
Web Analytics Approach

Analysis starts with a question, with a gap in your knowledge that you wish to fill, for instance:

- a) “Where do users go after viewing the our services page?”
- b) “What pages do users spend the most time on?”
- c) “What are the categories of information needs that drive users to my website?”
- d) “Why aren’t users clicking on this button?”
- e) “Why do so many users go to this page?”

¹The script is mainly based on “A First Course in Database Systems”, J. Ullman, J. Widom. Mostly examples and exercises are created by the author of this script.

A Model for Analysis



- a) **Pose The Question**: analysis starts with a question, with a gap in your knowledge you wish to fill.
- b) **Gather Data**: access to the data source or sources that will meet your needs and gather the data from the appropriate tools [i.e. **Google Analytics** - free and widely used in organizations of all sizes -, Customer Relationship Management (CRM)].
- c) **Transform Data**: transform the data in some way combining disparate data into a single table, sort or filter through a data set to get the subset that you need.
- d) **Analyze**: interpret the data that you have gathered and transformed.

How Web Analytics Works

1. **Log file**: web servers keep records of transactions. Every time they get a request, whether it is from a browser or a search engine crawler, it gets recorded in the log file.
2. **Page tagging** method works by adding a small piece of **JavaScript** code to all of the pages on the website to track.

A cookie is a piece of data that a website stores on users' computers. They are used to keep track of things like user preferences, what the user was doing on the website the last time he or she visited, and to keep track of whether a user is currently logged on to a website or not.

Database: “Online Market”

“High-quality Italian food marketplaces, are now available on the Web. High quality regional Italian food can be purchased with few clicks and then tasted. This is a way to exhibit the culture and history of Italian regions”.

Assume to design a database in order to show and sell traditional foods by a “web site”, further keep track of user’s “browsing” through the page [**user’s experience**].

The design is realized in **two phases**:

A) Detailed Food Information

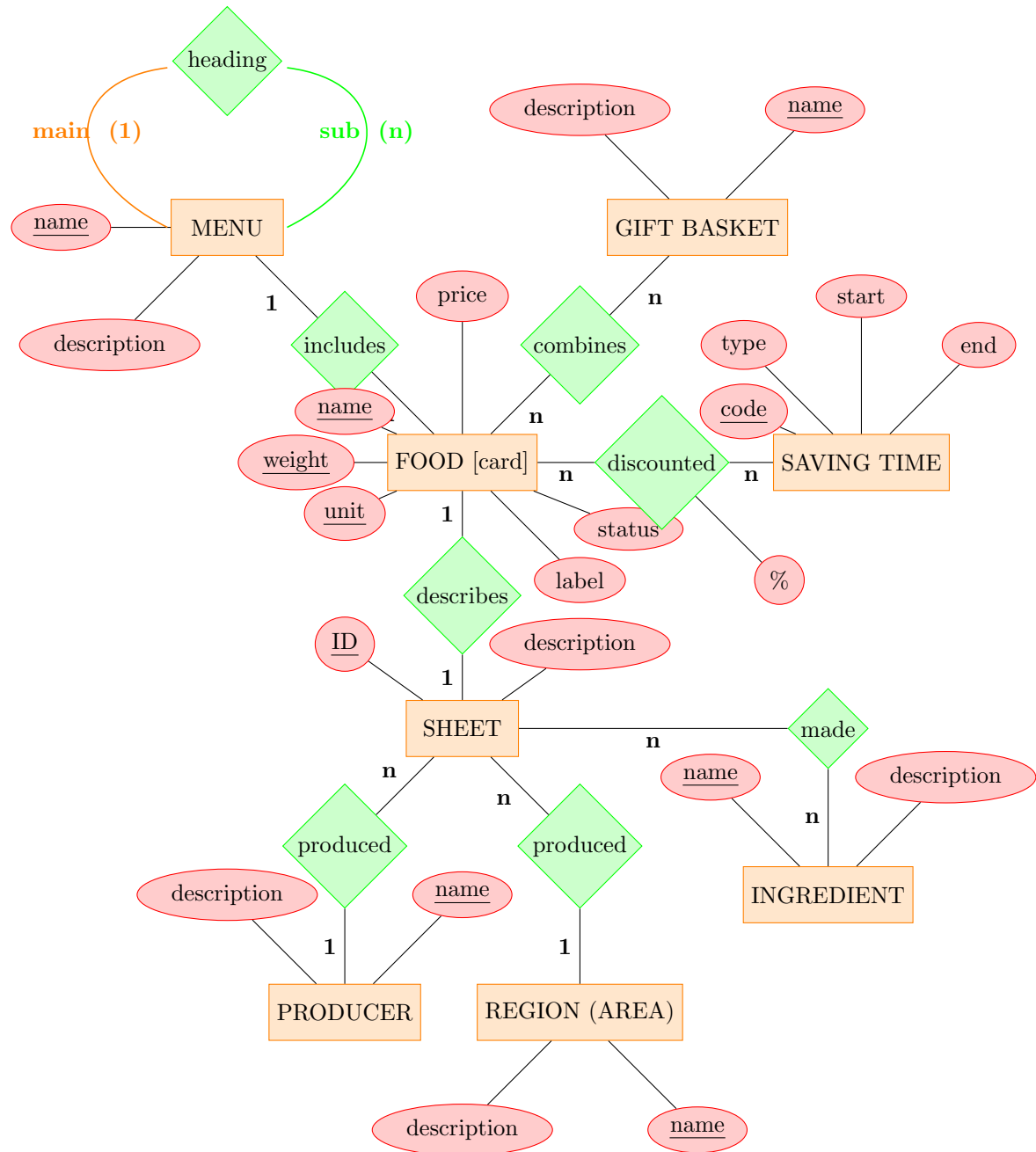
1. Italian traditional **food** is described through a name, weight and unit, which uniquely identify a food product. Further it has **price**, descriptive **label**, **status** specifying availability.
2. In order to give a user friendly tool for searching, food products are grouped. We assume to define a **menu** of items, each one having **name** and **description**, where each menu represents a group of foods. Aiming to improve searching, **menu items** can be grouped into **main menu item**, for example “salumi” and “formaggi” can be items of the main menu “salumi e formaggi”.
3. Combinations of different foods are prepared as **gift baskets**, especially in some periods of the year (for example Christmas). The database keeps track of all gift baskets, simply with **name** and **description**.
4. Food is described by a **sheet**, that can be shown clicking on a “button”. In this design it appears reasonable to register and show a unique sheet for each product. A sheet has at least one description, even though it can be related to many other data providing additional information:

producer, **ingredients** and **region (area)** are registered and can be consulted as additional information in the sheet. Basically they have **name** and **description**.

5. We assume local specificity of a food for that region.
6. Foods name shall be clearly reported.
7. Saving price **campaigns** occur during the year, for a specified period of time some products are discounted.

Detailed Food Information

1. Conceptual Schema [E/R Diagram]



2. Relational Model [Tables]

Region(name, description)

Producer(name, description)

Sheet(ID, description, Region.name, Producer.name)

Ingredient(name, description)

Made(Ingredient.name, Sheet.ID)

Menu(name, description, main)

Food(name, weight, unit, label, price, status, Menu.menu_name, Sheet.ID)

Saving(code, type, start, end)

Discounted(Food.name, Food.weight, Food.unit, Saving.code, perc)

GiftBasket(name, description)

BasketCombines(GiftBasket.name, Food.name, Food.weight, Food.unit)

B) Track Browsing

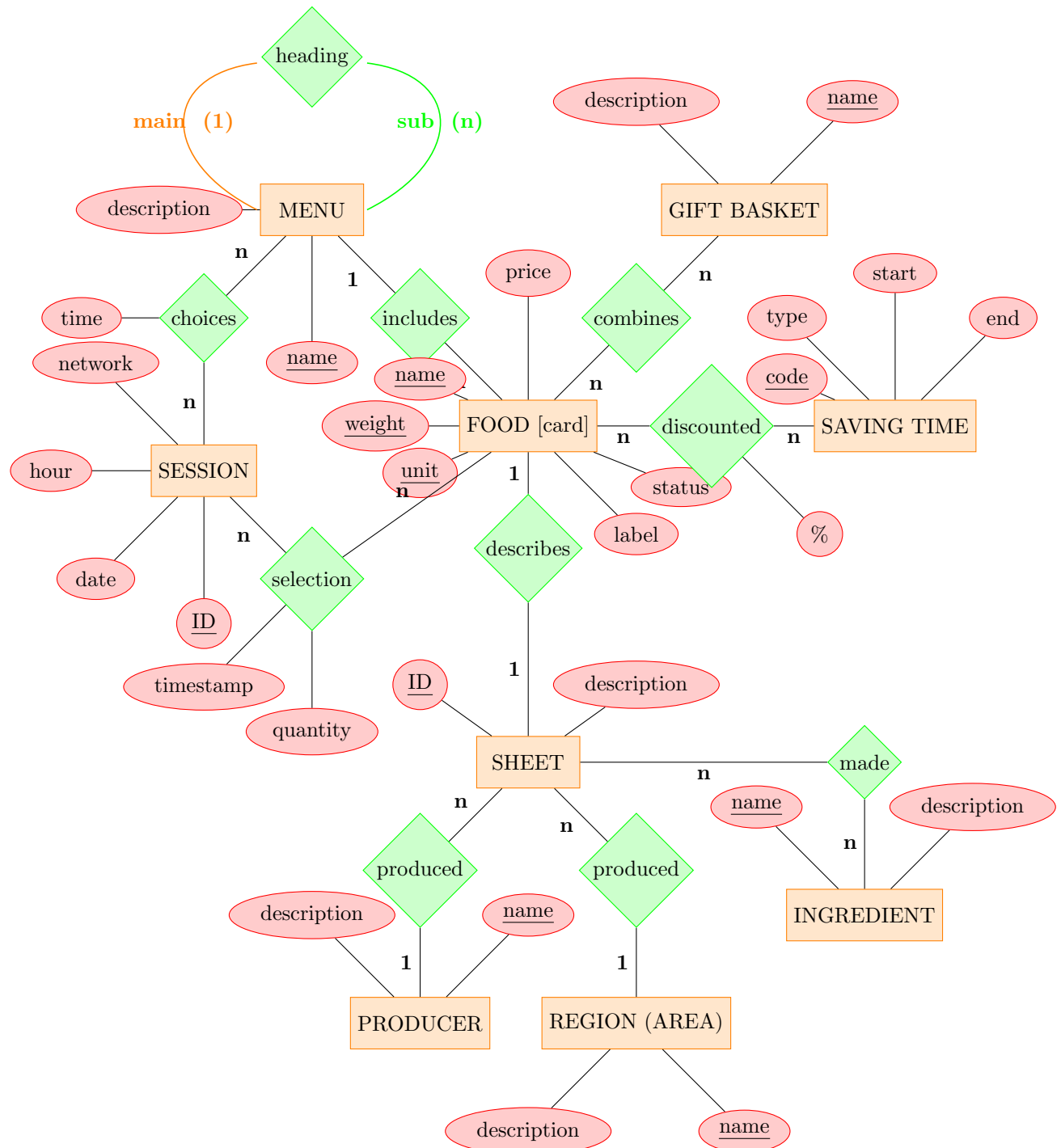
1. Marketing unit intend to **measure** food offer **appreciation** by web navigators. Therefore the web site should implement web analytics tool aiming in this phase to keep track of menu choice which gives to the navigator a sight to few products in that menu. This choice is interpreted as an interest for a category of products.

Additionally the tool is requested to keep track of foods moved into the **purchase basket**.

2. When a web-navigator accesses the web site, an automatic ID is generated and registered, in order to track the fact that a new browsing **session** starts. For each session should be registered **date**, **time** and **network** information (network IP).
3. Clicking on a menu item implies **one record**: session identifier, menu key and time (in seconds) spent on this page, that is until the navigator moves to another menu or browses details of a product or clicks on other elements in the page.
4. Selecting food to add to the purchase basket implies **one record**: session identifier, food key, **quantity**, and a **timestamp** (a way to identify a point in time).

Track Browsing

1. Conceptual Schema [E/R Diagram]



2. Relational Model [Tables]

Region(name, description)
Producer(name, description)
Sheet(ID, description, Region.name, Producer.name)
Ingredient(name, description)
Made(Ingredient.name, Sheet.ID)
Menu(name, description, main)
Food(name, weight, unit, label, price, status, Menu.menu_name, Sheet.ID)
Saving(code, type, start, end)
Discounted(Food.name, Food.weight, Food.unit, Saving.code, perc)
GiftBasket(name, description)
BasketCombines(GiftBasket.name, Food.name, Food.weight, Food.unit)
Session(ID, date, hour, network)
Choices(Session.ID, Menu.name, time)
Selection(Session.ID, Food.name, Food.weight, Food.unit, quantity, timestamp)

3. online_market_large.sql

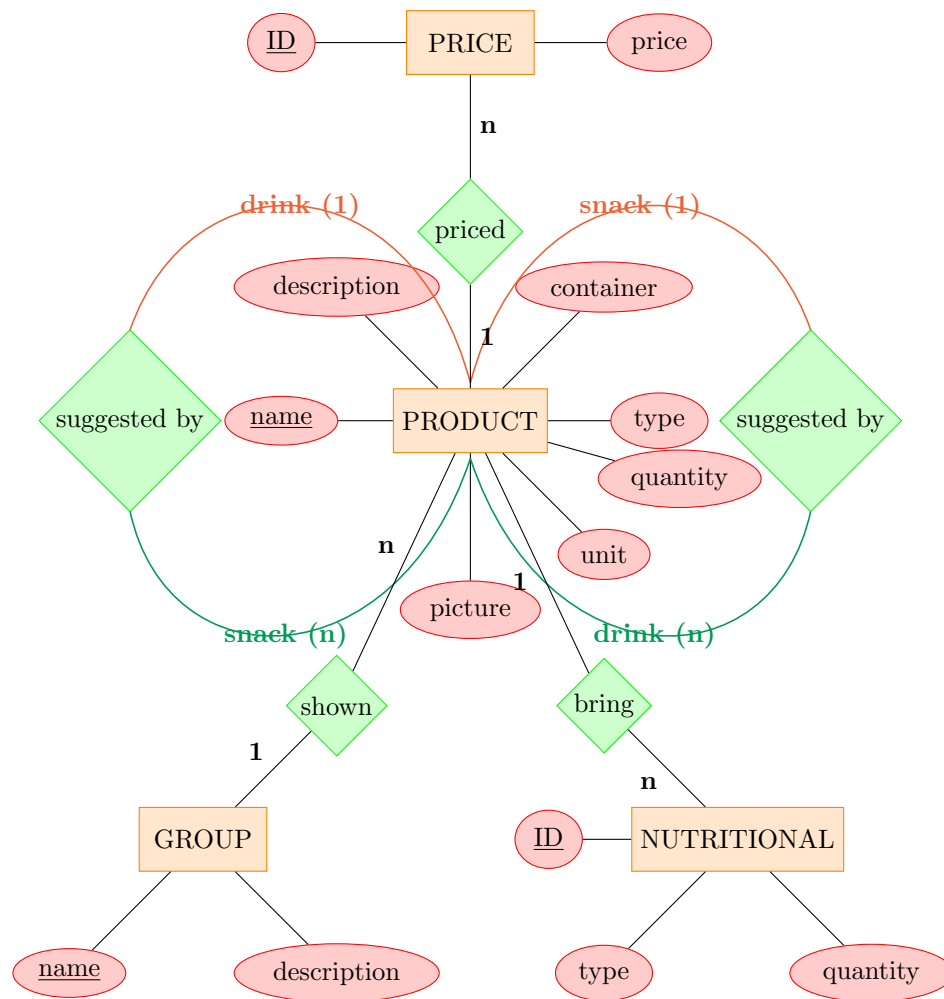
Database: “Vending Machine”

1. “Vending machine is a popular way to sell hot drinks and snacks for coffee breaks. Aiming to be more attractive in vending new approaches should be implemented.”

It is the aim to define and implement a **database** that supports new selling approaches of hot drinks and snacks by means of vending machine.

Draw the E/R diagram that capture the requirements stated below:

- (a) A variety of classic and new **hot drinks** are available in the vending machines. In the database are identified by a name, and full described (main ingredients, specialities, ...). Moreover we need in the database the quantity (milliliters) and in which way (plastic cup, plastic glass, ...) is dispensed. In order to be attractive we have a nice picture to show during user’s selection;
- (b) A variety of **snacks** are available in the vending machines. In the database are identified by a name, and full described (main ingredients, specialities, ...). Moreover we need in the database the quantity (grams) and in which way (bag, box, ...) is dispensed. In order to be attractive we have a nice picture to show during user’s selection;
- (c) Whenever a user selects a hot drink at the same time is shown a selection of snacks that could be “appreciated”, in the same way whenever a user selects a snack at the same time is shown a selection of hot drinks. In the database hot drinks and snacks should be related, but typically **they are related in a different way**;
- (d) Hot drinks and snacks have a **price**. We have a main price. Typically for each product we have **at least two** different prices: one standard price and one discounted price whenever the user pays by means of a pre-paid card;
- (e) The user is able to require details about nutritional values of hot drinks and snacks. Each nutritional is described by a type (vitamin, mineral, fat), the quantity (grams) it can benefit. Typically a product provide **many** types of nutritional;
- (f) Aiming to implement an innovative promotions of hot drinks and snacks, these are grouped (for example if they are suitable for breakfast, for an afternoon break, and so on).



2. Translate the E/R digram into the corresponding “relations”.

Group(name, description)

Product(name, type, description, quantity, unit, container, picture, group.name
suggestedby.drink, suggestedby.snack)

Price(ID, price, product.name)

Nutritional(ID, type, quantity, product.name)