

# **Ad Flyer Page Creation**

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Group #1

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## Introduction

This document summarizes the requirements, analysis, and design of a database system designed to support the needs of a small chain of grocery stores that wants to publish Sunday Ad Flyers.

## Project Specification

**Customer Name:** ICN

**Summary of Need:** ICN runs a small chain of grocery stores and wants to improve the workflow and reporting associated with their Sunday Ad Flyers.

**Motivation or Reason for Need:** The current process is not efficient, and does not provide the ability to generate business intelligence reporting.

**Nature of Business:** The purpose of the flyer is to improve sales and revenue, improve customer loyalty, and help to plan inventory.

**Workflow:** The Ad Flyer is a physical and digital piece of media which is created weekly. Each Sunday a new Ad Flyer is placed in-stores and mailed to residents within a certain radius of each store. Each Ad Flyer has a name and unique alphanumeric code to identify the Ad Flyer. It also has a start and end date for when the sales in the Ad Flyer are good for. An Ad Flyer also has a type such as weekly or 3-day Ad Flyer. Typically, this is one week, Sunday to Saturday, however they do run specials such as on Black Friday which do not run for a whole week. As well as longer running Ad Flyers for newly opened stores.

Each Ad Flyer contains some number of pages. On an average week ICN produces Ad Flyers with 6 pages, but this can go up and down depending on the offers for that week. Each page has a height and width for printing and an order to ensure the pages show correctly in the final product. ICN has a planning team which determines how much space each department of the store gets to show of their offers. The planning team does this by creating boxes or sections on a page in a grid-like layout. Each box is assigned a name to be easily identifiable and a department. This lets the department know which box is theirs. The boxes or sections are of varying size and must be tracked for reporting purposes.

ICN creates offers which represent the ‘on sale’ items customers will see in the store. For example, “\$1.00 off Potato Chips”. Each offer has a name and a unique numeric identifier. It has a status for tracking purposes, and a type. It also holds the discount type and discount amount. For example, it could be \$1 off where dollar is the type, 1 is the amount or it could be 50% off where percent is the type and 50 is the amount. Each offer also has a list of items for which the discount is applied to. Each item has a unique numeric identifier, a name, a cost, a retail, and a supplier. The ‘on sale’ price should also be tracked in the system for each item.

**Statement of Customer-Perceived Requirements:** The current Ad Flyer process will be implemented in a database system which will store Ad Flyer data allow the creation of reports to help ICM manage and plan their business.

## Statement of Objectives

- Implement the Ad Flyer workflow in a database system
- Create reports based on queries to provide insight to the Ad Flyer process.

## Requirements

1	Users shall create Ad Flyers
2	A user must associate an Ad Flyer with one or more stores
3	A user must select a start date for the Ad Flyer
4	A user must enter an end date for the Ad Flyer
5	A user shall create one or more pages within an Ad Flyer
6	A user must select a page number for each page in an Ad Flyer
7	A user shall be able to enter a page height and a page width
8	When a page is created, the page height shall be set to 11 inches, and the width shall be set to 8.5 inches by default.
9	The planning team shall create and name boxes or sections of varying sizes on pages
10	The planning team shall assign boxes or sections on pages to departments
11	A user must be able to select a department from a constrained list of departments.
12	A user must be able to enter the name, status, offer department, discount type, and discount amount to represent an Offer.
13	A user shall be able to select 'dollar' or 'percent' for the discount type
14	If the discount type is dollar, the discount shall be calculated as the discount amount in dollars.
15	If the discount type is percent, the discount shall be calculated as the discount amount as a percentage.
16	The list of offer statuses shall be a constrained list of 'Draft, Pending Approval, Approved, and Rejected.
17	When an offer is created, the status shall be set to 'Draft' by default
18	A user must be able to associate a list of items to include in the offer. Each item in the offer list has a unique numeric identifier, a name, a cost, a retailer, and a supplier.
19	A user must be able to assign one offer to a box or section on a page
20	The user who created the offer must be tracked for reporting
21	The date the offer was created must be tracked for reporting
22	The on sale price shall be calculated as the item cost – discount amount.
23	The on sale price shall be tracked in the system for each item.
24	The margin shall be calculated as the on sale price – item cost
Report 1	Offers Report: List all offers which are approved and start within the next 3 weeks. Show the offer name, number of items in the offer, discount type, discount amount, the user who created the offer, when the offer was created, and the offer department
Report 2	Box or Section Report: For a specific Ad Flyer, list each box with its name and the name of the offer, if it has one, that is tied to the box or section
Report 3	Item Report: For a specific Ad Flyer, list all the items inside of the Ad Flyer. Including the offer number and name, item number, description, cost, 'on-sale' price, and margin.
Report 4	Ad Flyer Department Page Report: For a specific Ad Flyer, show the percentage of area each department has for the Ad Flyer. Calculate the area of each of the boxes or sections a department has, and divide it by the total area of the pages in the Ad flyer
Report 5	Late Offers Report: List all offers that are not approved within 6 weeks. Show the offer name, number of items in the offer, discount type, discount amount, offer department, the user who created the offer, and when the offer was created.
Report 6	Department Discount Report: For an ad flyer, list each department with content in the Ad Flyer, and for each department list each offer name, the total cost of each offer, the discount for each offer, and the margin for each offer.

Report 7	Ad Flyer Department Trend Page Report: For all Ad Flyers over the past year, show the percentage of area each department has for the Ad Flyers. Calculate the area of each of the boxes or sections a department has, and divide it by the total area of the pages in the Ad flyer.
Report 8	Department Discount Trend Report: For all Ad Flyers over the past year, list each department with content in the Ad Flyers, and for each department list the number of offers, the total cost the offers, the discount for the offers, and the margin for the offers, grouped by month.
Report 9	List all Ad Flyers that are scheduled to start in the next 2 weeks that have offers that are not approved. For each Ad Flyer with not approved offers, list the Ad Flyer, the Ad Flyer Start Date, for each not approved offer in the Ad Flyer, list the offer name, number of items in the offer, discount type, discount amount, offer department, the user who created the offer, and when the offer was created.

## Design

### *Schema*

ITEM (Name: STRING, Cost: INT, Supplier: STRING, Retailer: STRING, Item\_ID: INT references LISTOF, Sale: INT)

Key: {Item\_ID}

OFFER (Name: STRING, Status: STRING, Type: STRING, Date: DATE, Dept: STRING, Amount: STRING, User\_ID: STRING, Offer\_ID: INT references LISTOF)

Key: {Offer\_ID}

BOX (Size: INT, Row: INT, Column: INT, Dept: STRING, Offer\_ID: INT references OFFER, Box\_ID: STRING references PAGE, Ad\_ID: STRING references PAGE, Num: INT references PAGE)

Key: {Box\_ID}

PAGE (Height: INT, Width: INT, Total\_Col: INT, Total\_Row: INT, Num: INT, Ad\_ID: STRING references ADFLYER, Box\_ID: STRING)

Key: {Ad\_ID, Num}

ADFLYER (Name: STRING, SDate: DATE, EDate: DATE, NumDays: INT, Ad\_ID: STRING)

Key: {Ad\_ID}

ListOf (Item\_ID: INT, Offer\_ID: INT)

Key: {Item\_ID, Offer\_ID}

## ***Data Dictionary***

**Table: Item**

Field Name	Datatype	Description	Example
Name	String	Name of the item	Banana
Cost	Int	Price of the item	2
Supplier	String	The supplier of the item	John's Fruit Farm
Retailer	String	The people who will sell the item	Wegman's
Item_ID	Int	Unique Id number of the item	12532
Sale	String	Description of the sale	None

**Table: Ad\_Flyer**

Field Name	Datatype	Description	Example
AD_ID	String	Unique alphanumeric Id of the flyer	19g
Name	String	Name of the flyer	Black Friday
SDate	Date	This is the first date the flyer will be valid	5/7/21
EDate	Date	This is the last date the flyer will be valid	6/7/21
NumDays	Int	The number of the days that the flyer is public for	30

Table: Offer

Field Name	Datatype	Description	Example
Offer_ID	Int	Id number of the offer	5425646
Name	String	Name of the offer	Chips
Dept	String	The name of the department that made the offer	Whole Foods
Type	String	Type of offer (whether amount/percent off)	percent
Status	String	Whether sale is active or inactive	Pending
Amount	Int	Amount of the offer	15
User_ID	String	User_Id of the offer	John324
Date	Date	Date of the offer	6/3/21

Table: Page

Field Name	Datatype	Description	Example
Ad_ID	String	Alphanumeric Id of the page, references HAS	G583
Num	Int	Number of the page on the flyer	12
Height	Int	Height of the page	12
Width	Int	Width of the page	6
Total_Col	Int	Total amount of columns on the page	3
Total_Row	Int	Total amount of rows on the page	3
Box_ID	String	ID of the box	45662



Table: Box

Field Name	Datatype	Description	Example
Name	String	Name of the box, references CONTAINS	Top left
Dept	String	Department that made the offer	Sea Food
Size	Int	Size of the box	2
Box_ID	String	ID of the box	546hj

Relation: LISTOF

Field Name	Datatype	Description	Example
Offer_ID	Int	References from Offer(Id)	5673567
Item_ID	Int	References from Item(Id)	52574

### *Constraints*

Table: Item

Field Name	Constraint
Name	Not Null
Cost	Between \$1 - \$1000000
Supplier	Not Null
Retailer	
Item_Id	Primary Key
Sale	Not Null

Table: Ad\_Flyer

Field Name	Constraint
AD_ID	Primary Key
Name	Not Null
SDate	Not Null
EDate	Not Null
NumDays	<365

Table: Offer

Field Name	Constraint
Offer_ID	Primary Key
Name	Primary Key
Dept	Not Null
Type	“Percent” or “Amount”
Status	“Draft” or “Pending” or “Approved” or “Denied”
Amount	Not Null
User_ID	Unique
Date	Not Null

Table: Page

Field Name	Constraint
Ad_ID	Primary Key
Num	Primary Key
Height	Table Check
Width	Table Check
Total_Col	Int
Total_Row	Int
Box_ID	Unique

Table: Box

Field Name	Constraint
Name	Primary Key
Dept	Not Null
Size	Not Null
Box_ID	Primary Key

Relation: LISTOF

Field Name	Constraint
Offer_ID	Primary Key
Item_ID	Primary Key

## *Queries*

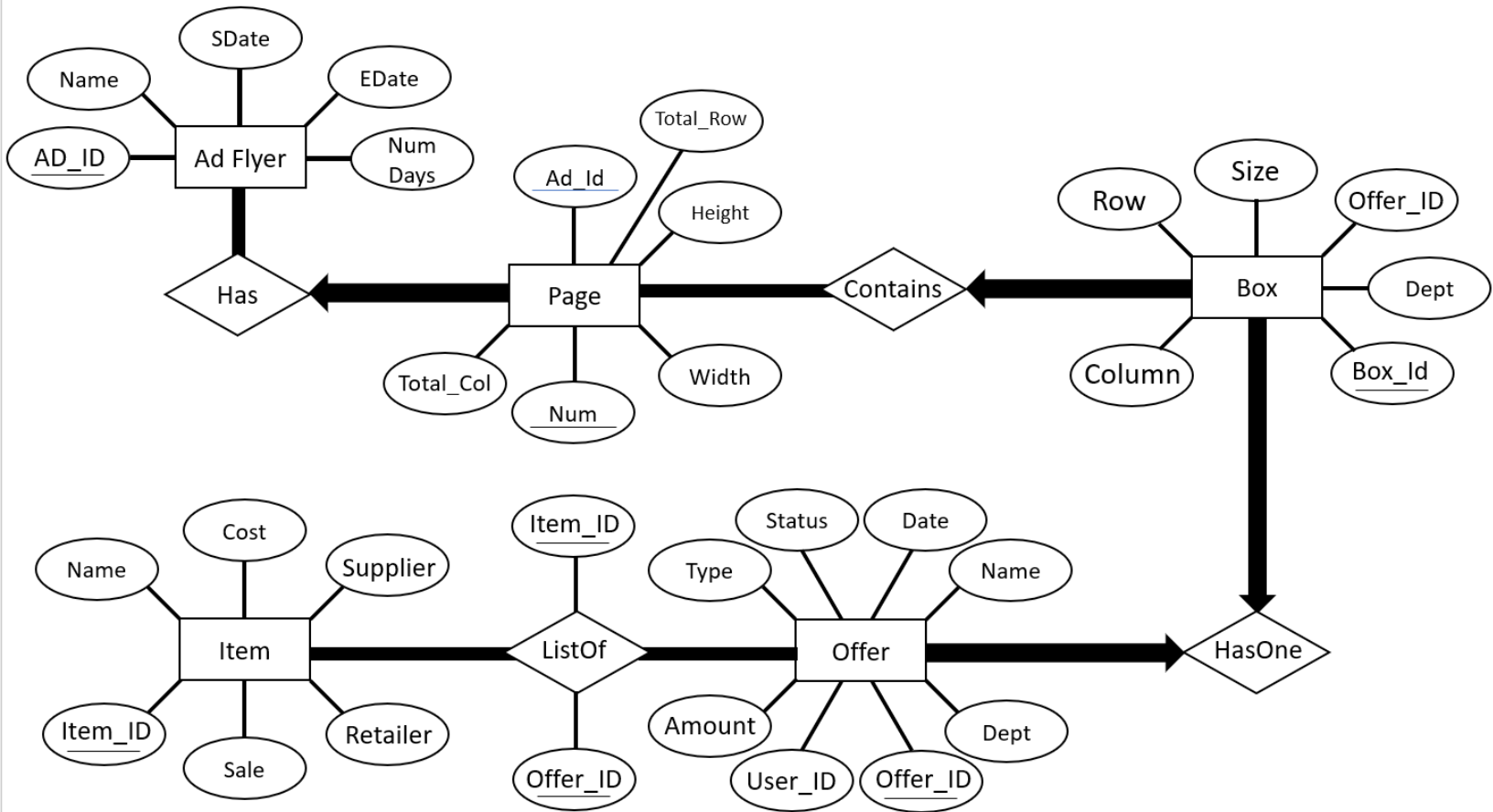
The following queries will satisfy the project requirements:

- 1) Create an Ad Flyer using attributes as per Ad\_Flyer schema
- 2) Create a Page for the ad flyer as per the Page schema
- 3) Create boxes on the page as per the Box schema
- 4) Create an offer for each box as per the Offer schema
- 5) Give an offer an item as per the Item schema
- 6) Assign a start and end date to each ad flyer
- 7) Assign the dimensions for each page
- 8) A department will be assigned for each offer created
- 9) A newly created offer will start in the draft phase
- 10) The price of an item will be the cost minus the discount
- 11) Display the approved offers that start soon
- 12) Display the offer attributes for the approved offers: name, number of items, type, amount, user id, offer id, department, date
- 13) Display the boxes that belong to a page with the; row, column, size, offer id, box id, and department
- 14) Display the items apart of an ad flyer with their attributes; name, cost, supplier, retailer, sale type, and item id
- 15) Divide the size of a box by the height and width to get the total rows and columns, each box takes up one of those rows and columns
- 16) Display the offers not approved within a certain time frame with their attributes; name, number of items, type, amount, department, user id, date
- 17) Display the departments associated with a box id, for those departments list the offers name, total cost, discount, and margin
- 18) Display, over the past year, the percentage of area each department by taking the area of that departments boxes and dividing it by the total area of the ad flyers pages
- 19) Display, over the past year, a department with offers in the ad flyer and the number of offers, total cost of the offers, discount on the offers, margin for the offers, grouped in months
- 20) Display the ad flyers whom start date is within two weeks and has pending offers, list their start date, ad flyer is belongs to, as well as, the pending offers name, number of items in it, type, amount, department, user id, date

### *Requirements Matrix*

Report	1	2	3	4	5	6	7	8
Req 1	X	X	X	X		X	X	X
Req 2	X	X	X	X		X	X	X
Req 3	X	X	X	X		X	X	X
Req 4	X	X	X	X		X	X	X
Req 5	X	X	X	X		X	X	X
Req 6		X	X	X		X	X	X
Req 7		X		X			X	
Req 8		X		X			X	
Req 9		X	X	X		X	X	X
Req 10		X	X	X		X	X	X
Req 11		X	X	X	X	X	X	X
Req 12	X	X	X		X	X		X
Req 13	X		X			X		X
Req 14			X			X		X
Req 15			X			X		X
Req 16	X					X		X
Req 17	X				X			
Req 18		X	X		X	X		X
Req 19		X	X			X		X
Req 20	X				X			
Req 21	X				X			
Req 22			X			X		X
Req 23			X			X		X
Req 24			X			X		X

## Entity-Relationship Diagram



## Test Plan

Test Case	Expected Result	Testing
Create Ad Flyer Record. Do not associate a store	Error	R2, R3, R4
Associate Ad Flyer with Store	No Error	R4
Create an ad Flyer Page Do not enter a page number	Error	R5, R6 ,R7 ,R8
Enter a page number	No Error	R6
Validate that the default page size is 8.5x11	No Error	R8
Update the page size	No Error	R7
Create and name boxes or sections of varying sizes on the page.	No Error	R9
Associate a box or section on a page with an invalid department	Error	R10, R11
Associate a box or section on a page with an invalid department	No Error	R10, R11
Create an offer with an invalid discount type	Error	R12, R13
Create an offer with a valid discount type Validate that the default status is set to 'Draft'	No Error	R12, R13, R17
Try to update an offer with an invalid status	Error	R16
Associate an invalid list of items with the offer.	Error	R18
Associate a valid list of items with the offer.	No Error	R18
Associate one offer to a box or section on a page	No Error	R19
Associate more than one offer to a section or box on a page.	Error	R19
Run offers report with offers that are not approved	Error, no records returned	Report 1
Run offers report with offers that are approved but do not start within 3 weeks	Error, no records returned	Report 1
Run offers report with offers that are approved and that start within 3 weeks	No Error	Report 1
Run Box or Section Report with a Flyer that has no pages	Error, no records returned	Report 2
Run Box or Section Report with a Flyer that has pages but no offers	No Error, records returned but no offers displayed	Report 2
Run Box or Section Report with a flyer that has pages and that has offers	No error	Report 2
Run Item Report with a Flyer that has no items	Error, no records returned	Report 3
Run Item Report with a Flyer	No Error	Report 3

that has items		
Run Ad Flyer Department Report	No Error – validate that the calculations are correct	Report 4
Run Late Offers Report with percent discount type	No Error – validate that the discount is calculated correctly	Report 5, R20, R21, R22, R23, R15
Run Late Offers Report with percent discount type	No Error – validate that the discount is calculated correctly	Report 5, R20, R21, R22, R23, R14
Run Late Offers Report with all offers within the next 6 weeks approved	Error – no records returned	Report 5
Run Department Discount Report	No Error	Report 6, R24
Run Department Discount Report with an invalid Ad Flyer ID	Error	Report 6
Run Ad Flyer Department Trend Page Report with less than a year's data	No Error – only the months with data available will be listed.	Report 7
Run Ad Flyer Department Trend Page Report with more than a year's data	No Error – only the latest 12 months of data will be listed.	Report 7
Run Department Discount Trend Report with less than a year's data	No Error – only the months with data available will be listed.	Report 8
Run Department Discount Trend Report with more than a year's data	No Error – only the latest 12 months of data will be listed	Report 8