print(df)

```
In [1]: import pandas as pd # For data manipulation and analysis
                    import numpy as np # For numerical computations
                    import matplotlib.pyplot as plt # For creating static, animated, and interactive visualizations
                    import seaborn as sns # For statistical data visualization based on Matplotlib
                    import scipy # For scientific and technical computing (including optimization, integration, and statistics)
In [2]: # Creating realistic data for employees
                    data = {
                              'Employee ID': np.arange(1001, 1011),
                             'Employee Name': ['Satender Kumar', 'data 1', 'Jane Smith', 'Robert Brown', 'Emily Davis', 'Michael Wilson' 'Department': ['Data Analyst', 'IT', 'Finance', 'Marketing', 'Sales', 'Operations', 'R&D', 'Support', 'Admin
                             'Age': [24, np.random.randint(25, 60), np.random.randint(25, 60), np.random.randint(25, 60), np.random.rand.
                             'Location': ['London, Canada', 'Toronto', 'London', 'Sydney', 'San Francisco', 'Paris', 'Berlin', 'Tokyo', 'Salary': np.random.randint(50000, 150000, size=10),
                             'Years with Company': np.random.randint(1, 15, size=10),
                             'Position': ['Data Analyst', 'Developer', 'Analyst', 'Designer', 'Consultant', 'Engineer', 'Scientist', 'Superformance Score': np.random.randint(1, 5, size=10),
                             'Bonus': np.random.randint(1000, 10000, size=10),
                             'Gender': ['Male', 'Male', 'Female', 'Male', 'Female', 'Female', 'Male', 'Female', 'Male'], 'Marrital Status': ['Single', 'Single', 'Married', 'Single', 'Married', '
                             'Education': ['Bachelor', 'Master', 'PhD', 'Bachelor', 'Master', 'PhD', 'Bachelor', 'Master', 'Bachelor', 'I'
'Hire Date': pd.to_datetime(['2019-06-12', '2015-07-23', '2012-09-05', '2018-11-30', '2013-05-19', '2019-02
                             'Overtime Hours': np.random.randint(0, 20, size=10),
                              'Sick Days Taken': np.random.randint(0, 10, size=10),
                              'Vacation Days Taken': np.random.randint(5, 20, size=10),
                              'Training Hours': np.random.randint(10, 50, size=10),
                             'Certifications': ['Yes', 'No', 'Yes', 'No', 'Yes', 'Yes', 'Yes', 'Yes', 'No', 'Yes'],
'Supervisor': ['Anna Smith', 'Brian Adams', 'Clara Jones', 'Daniel Martin', 'Eva Rodriguez', 'Frank Bell',
                    # Creating the DataFrame
                    df = pd.DataFrame(data)
In [4]: # Display the DataFrame
```

	Employee ID	Employee	Name	Depai	rtment	Age		Location	Salary	\
0	1001	Satender K	umar	Data Ar	nalyst	24	London	, Canada	62989	
1	1002	da	ta 1		IT	46		Toronto	96061	
2	1003	Jane Si	mith	Fi	inance	48		London	60507	
3	1004	Robert B	rown	Mark	keting	32		Sydney	71727	
4	1005	Emily Da	avis		Sales	40	San F	rancisco	81098	
5	1006	Michael Wi	lson	0pera	ations	45		Paris	60924	
6	1007	Sarah Ta			R&D	58		Berlin	116105	
7	1008	David	,	Sı	upport	28		Tokyo	138939	
8	1009	Laura Joh		50	Admin	38		Dubai	93249	
9	1010	James W			Legal	46	c	ingapore	141721	
9	1010	Jailles W	пте		Legat	40	3	Tilgapore	141/21	
	Vaara viith Ca		Do	+	Donfo			Danus	Candan	,
_	Years with Co			sition	Регто	rmanc	e Score		Gender	\
0				nalyst			4		Male	
1		5		eloper			4	4746	Male	
2		1		nalyst			1		Female	
3		9		esigner			3	7196	Male	
4		13	Cons	ultant			3		Female	
5		6	En	ngineer			2	7973	Male	
6		13	Sci	entist.			4	7565	Female	
7		9 S	upport	Agent			3	1800	Male	
8		7 Adm	in Ass	istant			4	1189	Female	
9		2		Lawyer			2	1654	Male	
				•						
	Marital Status	Education	Hire	Do+o	د د د د د د د			-I. D	T-1 \	
_				: Date	0verti	те но	urs 51	ck bays	Taken \	
0					overti	те но	urs 51 10	ck Days <sup>-</sup>		
	Single	Bachelor	2019-	06-12	overti	те но	10	ск рауѕ	2	
1	Single Single	Bachelor Master	2019 - 2015 -	06-12 07-23	overti	те но	10 15	ck Days	2 7	
1 2	Single Single Married	Bachelor Master PhD	2019 - 2015 - 2012 -	06-12 07-23 09-05	overti	те но	10 15 0	ск рауѕ	2 7 5	
1 2 3	Single Single Married Single	Bachelor Master PhD Bachelor	2019 - 2015 - 2012 - 2018 -	06-12 07-23 09-05 11-30	overti	те но	10 15 0 18	ck bays	2 7 5 3	
1 2 3 4	Single Single Married Single Single	Bachelor Master PhD Bachelor Master	2019 - 2015 - 2012 - 2018 - 2013 -	06-12 07-23 09-05 11-30 05-19	overti	те но	10 15 0 18 1	ck bays	2 7 5 3 7	
1 2 3 4 5	Single Single Married Single Single Married	Bachelor Master PhD Bachelor Master PhD	2019 - 2015 - 2012 - 2018 - 2013 - 2019 -	06-12 07-23 09-05 11-30 05-19 02-14	overti	те но	10 15 0 18 1	ck bays	2 7 5 3 7 1	
1 2 3 4 5 6	Single Single Married Single Single Married Married	Bachelor Master PhD Bachelor Master PhD Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21	overti	те но	10 15 0 18 1 0 3	ck bays	2 7 5 3 7 1	
1 2 3 4 5 6 7	Single Single Married Single Single Married Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Master	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03	overti	те но	10 15 0 18 1 0 3 6	ск рауѕ	2 7 5 3 7 1 0	
1 2 3 4 5 6 7 8	Single Single Married Single Single Married Single Married	Bachelor Master PhD Bachelor Master PhD Bachelor Master Master Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28	overti	те но	10 15 0 18 1 0 3 6 15	ск рауѕ	2 7 5 3 7 1 0 0	
1 2 3 4 5 6 7	Single Single Married Single Single Married Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Master Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28	overti	те но	10 15 0 18 1 0 3 6	ck bays	2 7 5 3 7 1 0	
1 2 3 4 5 6 7 8	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15			10 15 0 18 1 0 3 6 15 3	·	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Married	Bachelor Master PhD Bachelor PhD Bachelor Master Master Bachelor Master Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours		icati	10 15 0 18 1 0 3 6 15 3	Supervi	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Bachelor Taken Tra	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours		icati	10 15 0 18 1 0 3 6 15 3	Supervi: Anna Sm:	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor PhD Bachelor Master Master Bachelor Master Bachelor	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours		icati	10 15 0 18 1 0 3 6 15 3	Supervi	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Bachelor Taken Tra	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No	Supervi: Anna Sm:	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Taken Tra 19 14	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No	Supervi: Anna Sm: Brian Ada	2 7 5 3 7 1 0 0 1 7	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Taken Tra 19 14 7	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes	Supervi: Anna Sm: Brian Ada Clara Joi	2 7 5 3 7 1 0 0 1 7 sor ith	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Taken Tra 19 14 7 11	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes	Supervi: Anna Sm: Brian Ada Clara Jon niel Mar	2 7 5 3 7 1 0 0 1 7 sor ith ams nes tin	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Taken Tra 19 14 7 11 17	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37 12 30		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes No Da Yes Ev	Supervi: Anna Sm: Brian Ada Clara Jon niel Mar a Rodrigi	2 7 5 3 7 1 0 0 1 7 sor ith ams nes tin uez ell	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Taken Tra 19 14 7 11 17 16	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37 12 30 24		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes No Yes No Yes No Yes	Supervi: Anna Sm: Brian Ada Clara Jon niel Mar a Rodrigo Frank Bo	2 7 5 3 7 1 0 0 1 7 sor ith ams nes tin uez ell ore	
1 2 3 4 5 6 7 8 9	Single Single Married Single Single Married Single Single	Bachelor PhD Bachelor Master PhD Bachelor Master Master Bachelor Master Bachelor Taken Train 19 14 7 11 17 16 7	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37 12 30 24		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes No Yes No Yes No Yes	Supervi: Anna Sm: Brian Ada Clara Joi niel Mar a Rodrigi Frank Be Grace Moo	2 7 5 3 7 1 0 0 1 7 sor ith ams nes tin uez ell ore wis	
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7	Single Single Married Single Single Married Single Single	Bachelor Master PhD Bachelor Master PhD Bachelor Master Bachelor Master Bachelor Taken Tr 19 14 7 11 17 16 7 6	2019 - 2015 - 2012 - 2018 - 2013 - 2019 - 2020 - 2016 - 2014 - 2017 -	06-12 07-23 09-05 11-30 05-19 02-14 08-21 06-03 01-28 03-15 Hours 15 31 37 12 30 24 49		icati	10 15 0 18 1 0 3 6 15 3 ons Yes No Yes No Yes Ev No Yes Ev No Yes	Supervi: Anna Sm: Brian Ada Clara Joi niel Mar a Rodrig Frank Be Grace Mod annah Lev	2 7 5 3 7 1 0 0 1 7 sor ith ams nes tin uez ell ore wis ott	

In [6]: df.head()

Out[6]:

:	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Educati
0	1001	Satender Kumar	Data Analyst	24	London, Canada	62989	10	Data Analyst	4	6419	Male	Single	Bache
1	1002	data 1	IT	46	Toronto	96061	5	Developer	4	4746	Male	Single	Mas
2	1003	Jane Smith	Finance	48	London	60507	1	Analyst	1	1447	Female	Married	Pl
3	1004	Robert Brown	Marketing	32	Sydney	71727	9	Designer	3	7196	Male	Single	Bache
4	1005	Emily Davis	Sales	40	San Francisco	81098	13	Consultant	3	2218	Female	Single	Mas
4													<b>)</b>

In [10]: df.describe()

$\alpha$		ьΓ	11	o.'	1 -	
u	u	u,	Τ.	ω,	1 1	

	Employee ID	Age	Salary	Years with Company	Performance Score	Bonus	Hire Date	Overtime Hours	Sick Days Taken	Vacation Days Taken	Tı
count	10.00000	10.000000	10.000000	10.000000	10.000000	10.000000	10	10.000000	10.000000	10.000000	10.
mean	1005.50000	40.500000	92332.000000	7.500000	3.000000	4220.700000	2016- 09-28 09:36:00	7.100000	3.300000	12.700000	28.
min	1001.00000	24.000000	60507.000000	1.000000	1.000000	1189.000000	2012- 09-05 00:00:00	0.000000	0.000000	6.000000	10.
25%	1003.25000	33.500000	65173.500000	5.250000	2.250000	1690.500000	2014- 06-12 06:00:00	1.500000	1.000000	8.000000	17.:
50%	1005.50000	42.500000	87173.500000	8.000000	3.000000	3482.000000	2016- 10-23 12:00:00	4.500000	2.500000	12.500000	30.
75%	1007.75000	46.000000	111094.000000	9.750000	4.000000	7001.750000	2019- 01-26 00:00:00	13.750000	6.500000	16.750000	37.
max	1010.00000	58.000000	141721.000000	13.000000	4.000000	7973.000000	2020- 08-21 00:00:00	18.000000	7.000000	19.000000	49.1
std	3.02765	10.276727	30916.484542	4.116363	1.054093	2839.564366	NaN	6.871034	2.945807	5.012207	13.

In [12]: df.isnull()

Out[12]:

:	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Educatio
0	False	False	False	False	False	False	False	False	False	False	False	False	Fals
1	False	False	False	False	False	False	False	False	False	False	False	False	Fals
2	False	False	False	False	False	False	False	False	False	False	False	False	Fals
3	False	False	False	False	False	False	False	False	False	False	False	False	Fals
4	False	False	False	False	False	False	False	False	False	False	False	False	Fals
5	False	False	False	False	False	False	False	False	False	False	False	False	Fals
6	False	False	False	False	False	False	False	False	False	False	False	False	Fals
7	False	False	False	False	False	False	False	False	False	False	False	False	Fals
8	False	False	False	False	False	False	False	False	False	False	False	False	Fals
9	False	False	False	False	False	False	False	False	False	False	False	False	Fals

In [14]: df.notnull()

Out[14]:

	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Education
0	True	True	True	True	True	True	True	True	True	True	True	True	True
1	True	True	True	True	True	True	True	True	True	True	True	True	True
2	True	True	True	True	True	True	True	True	True	True	True	True	True
3	True	True	True	True	True	True	True	True	True	True	True	True	True
4	True	True	True	True	True	True	True	True	True	True	True	True	True
5	True	True	True	True	True	True	True	True	True	True	True	True	True
6	True	True	True	True	True	True	True	True	True	True	True	True	True
7	True	True	True	True	True	True	True	True	True	True	True	True	True
8	True	True	True	True	True	True	True	True	True	True	True	True	True
9	True	True	True	True	True	True	True	True	True	True	True	True	True

```
10
                   Department
                   Age
                                                                10
                   Location
                                                                10
                   Salary
                                                                10
                   Years with Company
                                                                10
                   Position
                                                                10
                   Performance Score
                                                                10
                   Bonus
                                                                10
                   Gender
                                                                10
                   Marital Status
                                                                10
                   Education
                                                                10
                   Hire Date
                                                                10
                   Overtime Hours
                                                                10
                   Sick Days Taken
                                                                10
                   Vacation Days Taken
                                                                10
                   Training Hours
                                                                10
                   Certifications
                                                                10
                   Supervisor
                                                                10
                   dtype: int64
In [19]: df.head(20
Out[19]:
                                                                                                                                 Years
                        Employee
                                          Employee
                                                                                                                                                                Performance
                                                                                                                                                                                                                    Marital
                                                                                                                                                Position
                                                                                                                                                                                       Bonus Gender
                                                            Department Age
                                                                                            Location
                                                                                                              Salary
                                                                                                                                    with
                                                                                                                                                                                                                                 Educat
                                   ID
                                                Name
                                                                                                                                                                           Score
                                                                                                                                                                                                                    Status
                                                                                                                           Company
                                            Satender
                                                                        Data
                                                                                              London.
                                                                                                                                                      Data
                  0
                                1001
                                                                                                               62989
                                                                                                                                                                                          6419
                                                                                    24
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                     Single
                                                                                                                                                                                                                                     Bach
                                                Kumar
                                                                    Analyst
                                                                                               Canada
                                                                                                                                                  Analyst
                   1
                                1002
                                                data 1
                                                                                    46
                                                                                               Toronto
                                                                                                               96061
                                                                                                                                        5
                                                                                                                                              Developer
                                                                                                                                                                                          4746
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                     Single
                                                                                                                                                                                                                                       Ma
                                                  Jane
                  2
                                1003
                                                                   Finance
                                                                                    48
                                                                                               London
                                                                                                               60507
                                                                                                                                        1
                                                                                                                                                  Analyst
                                                                                                                                                                                  1
                                                                                                                                                                                          1447
                                                                                                                                                                                                    Female
                                                                                                                                                                                                                   Married
                                                 Smith
                                                Robert
                  3
                                1004
                                                                Marketing
                                                                                    32
                                                                                                Sydney
                                                                                                               71727
                                                                                                                                                Designer
                                                                                                                                                                                  3
                                                                                                                                                                                          7196
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                     Single
                                                                                                                                                                                                                                    Bach
                                                Brown
                                                 Emily
                                                                                                    San
                  4
                                1005
                                                                                                               81098
                                                                       Sales
                                                                                    40
                                                                                                                                       13
                                                                                                                                             Consultant
                                                                                                                                                                                  3
                                                                                                                                                                                          2218
                                                                                                                                                                                                    Female
                                                                                                                                                                                                                     Single
                                                                                                                                                                                                                                       Ma
                                                 Davis
                                                                                            Francisco
                                               Michael
                  5
                                1006
                                                                                    45
                                                                                                               60924
                                                                                                                                        6
                                                                                                                                                                                  2
                                                                                                                                                                                          7973
                                                               Operations
                                                                                                  Paris
                                                                                                                                                Engineer
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                  Married
                                                Wilson
                                                 Sarah
                  6
                                1007
                                                                        R&D
                                                                                    58
                                                                                                  Berlin
                                                                                                             116105
                                                                                                                                       13
                                                                                                                                                 Scientist
                                                                                                                                                                                  4
                                                                                                                                                                                          7565
                                                                                                                                                                                                     Female
                                                                                                                                                                                                                   Married
                                                                                                                                                                                                                                    Bach
                                                Taylor
                                                                                                                                                 Support
                  7
                                1008
                                          David Lee
                                                                    Support
                                                                                    28
                                                                                                 Tokyo
                                                                                                             138939
                                                                                                                                        9
                                                                                                                                                                                  3
                                                                                                                                                                                          1800
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                     Single
                                                                                                                                                                                                                                       Ма
                                                                                                                                                    Agent
                                                 Laura
                                                                                                                                                   Admin
                                                                                                                                        7
                  8
                                1009
                                                                      Admin
                                                                                    38
                                                                                                 Dubai
                                                                                                               93249
                                                                                                                                                                                          1189
                                                                                                                                                                                                     Female
                                                                                                                                                                                                                  Married
                                                                                                                                                                                                                                    Bach
                                              Johnson
                                                                                                                                                Assistant
                                                James
                                1010
                                                                                                                                        2
                                                                                                                                                                                          1654
                                                                                                                                                                                                                     Single
                  9
                                                                       Legal
                                                                                    46 Singapore 141721
                                                                                                                                                  Lawver
                                                                                                                                                                                  2
                                                                                                                                                                                                         Male
                                                                                                                                                                                                                                       Ma
                                                 White
In [21]: # Creating realistic data for a second set of employees
                          'Employee ID': np.arange(1011, 1021),
                          'Employee Name': ['Satender Kumar', 'data 1', 'Chris Evans', 'Natalie Portman', 'Tom Holland', 'Emma Watson 'Department': ['Data Analyst', 'HR', 'IT', 'Marketing', 'Finance', 'Sales', 'R&D', 'Operations', 'Legal', '
                          'Age': [24, np.random.randint(25, 60), np.random.randint(25, 60), np.random.randint(25, 60), np.random.randi
                          'Location': ['London, Canada', 'Los Angeles', 'New York', 'Chicago', 'Houston', 'Phoenix', 'Philadelphia',
                          'Salary': np.random.randint(60000, 160000, size=10),
                          'Years with Company': np.random.randint(1, 20, size=10),
                          'Position': ['Data Analyst', 'HR Manager', 'IT Specialist', 'Marketing Coordinator', 'Financial Analyst', '
                          'Performance Score': np.random.randint(1, 5, size=10),
                          'Bonus': np.random.randint(2000, 12000, size=10),
                          'Gender': ['Male', 'Male', 'Female', 'Female', 'Male', 'Female', 'Male', 'Female', 'Male', 'Male', 'Male', 'Male', 'Marital Status': ['Single', 'Married', 'Single', 'Married', 'Single', 'Married', 'Single', 'Married', 'Single', 'Master', 'PhD', 'Bachelor', 'Master', 'PhD', 'Bachelor', 'Master', 'PhD', 'Master', 'Master', 'Master', 'Master', 'Master', 'Master', 'Master', 'Master', 'Master', 'Mas
                          'Hire Date': pd.to datetime(['2018-07-15', '2014-03-22', '2011-10-12', '2017-04-17', '2015-09-23', '2016-11
                          'Overtime Hours': np.random.randint(0, 25, size=10),
                          'Sick Days Taken': np.random.randint(0, 8, size=10),
                          'Vacation Days Taken': np.random.randint(7, 22, size=10),
                          'Training Hours': np.random.randint(15, 55, size=10),
                          'Certifications': ['Yes', 'Yes', 'No', 'Yes', 'No', 'Yes', 'No', 'Yes', 'Yes', 'No'],
                          'Supervisor': ['John Smith', 'Michael Johnson', 'Patricia Williams', 'Linda Brown', 'Barbara Jones', 'Elizal
                  }
```

Out[16]: Employee ID

Employee Name

# Creating the second DataFrame
df1 = pd.DataFrame(data1)

10

10

```
In [23]: # Display the DataFrame
          print(df1)
                                                  Department
            Employee ID
                               Employee Name
                                                               Age
                                                                           Location
                                                                                      Salary
                   1011
                              Satender Kumar
                                                Data Analyst
                                                                24
                                                                    London, Canada
                                                                                       75719
         1
                   1012
                                       data 1
                                                          HR
                                                                40
                                                                        Los Angeles
                                                                                       96413
         2
                   1013
                                  Chris Evans
                                                           IT
                                                                37
                                                                           New York
                                                                                       74042
         3
                   1014
                             Natalie Portman
                                                                49
                                                                                      108467
                                                   Marketing
                                                                            Chicago
         4
                   1015
                                  Tom Holland
                                                                27
                                                                            Houston
                                                                                       65822
                                                     Finance
         5
                                                                            Phoenix
                   1016
                                  Emma Watson
                                                       Sales
                                                                                      114854
                                                                56
         6
                   1017
                            Daniel Radcliffe
                                                         R&D
                                                                33
                                                                       Philadelphia
                                                                                      117933
         7
                   1018
                          Scarlett Johansson
                                                                        San Antonio
                                                  Operations
                                                                41
                                                                                       87342
         8
                   1019
                           Robert Downey Jr.
                                                       Legal
                                                                51
                                                                          San Diego
                                                                                       72775
         9
                   1020
                                Mark Ruffalo
                                                                42
                                                                             Dallas
                                                                                      142745
                                                     Support
            Years with Company
                                                Position Performance Score
                                                                               Bonus
         0
                             12
                                           Data Analyst
                                                                            2
                                                                                3187
         1
                                             HR Manager
                                                                               10993
                             12
                                                                            1
         2
                             14
                                          IT Specialist
                                                                            4
                                                                               10834
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                             11
                                 Marketing Coordinator
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                                      Financial Analyst
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                                          Sales Manager
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                             17
                                     Research Scientist
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                                                                                8290
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                              8
                                     Operations Manager
                                                                            3
                                                                               10047
         8
                              6
                                          Legal Advisor
                                                                            2
                                                                                6510
         9
                             10
                                     Support Specialist
                                                                                5533
            Gender Marital Status Education Hire Date
                                                            Overtime Hours
         0
              Male
                            Single
                                       Master 2018-07-15
                                                                         17
         1
              Male
                           Married
                                     Bachelor 2014-03-22
                                                                          8
         2
                                       Master 2011-10-12
            Female
                            Single
                                                                         12
         3
            Female
                            Single
                                          PhD 2017-04-17
                                                                         10
         4
              Male
                           Married
                                     Bachelor 2015-09-23
                                                                         13
         5
            Female
                            Single
                                       Master 2016-11-01
                                                                         15
         6
              Male
                            Single
                                          PhD 2019-05-11
                                                                          8
         7
            Female
                           Married
                                     Bachelor 2020-07-08
                                                                         15
         8
              Male
                            Single
                                       Master 2013-08-19
                                                                          7
         9
                                          PhD 2012-01-09
                                                                          2
              Male
                           Married
            Sick Days Taken
                              Vacation Days Taken
                                                    Training Hours Certifications
         0
                           5
                                                 12
                                                                  21
                                                                                 Yes
         1
                           3
                                                 18
                                                                  41
                                                                                 Yes
         2
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         3
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                                                                  42
                                                 20
                                                                                 Yes
         4
                           6
                                                 11
                                                                  35
                                                                                  No
         5
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                                                 20
                                                                  35
                                                                                  Yes
         6
                                                                  48
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         7
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                                                                                 Yes
         8
                           7
                                                 20
                                                                  35
                                                                                 Yes
         9
                           4
                                                 17
                                                                  15
                                                                                  No
                   Supervisor
         0
                   John Smith
         1
              Michael Johnson
            Patricia Williams
                  Linda Brown
         4
                Barbara Jones
         5
             Elizabeth Garcia
               Susan Martinez
         6
            Jessica Hernandez
         8
                  Sarah Lopez
         9
                 Karen Wilson
Out[25]:
                                                                       Years
             Employee
                       Employee
                                                                                         Performance
```

In [25]: df1.head()

Portman Tom

Department Age Location Salary with **Position** Bonus Gender Educa ID Name Score Status Company Satender Data London, Data 0 1011 24 75719 12 2 3187 Male Single Ma Kumar Analyst Canada Analyst HR Los 1 1012 data 1 HR 40 96413 12 10993 Male Married Bach Angeles Manager Chris IT New 2 1013 ΙT 37 74042 14 10834 Female Single Ма Evans York Specialist Natalie Marketing 3 1014 Marketing 49 Chicago 108467 11 2760 Female Single

Marital

4 1015 27 65822 12 2 6263 Finance Houston Male Married Bach Holland Analyst

Coordinator

Financial

In [27]: | df.describe()

Out[27]:

		Employee ID	Age	Salary	Years with Company	Performance Score	Bonus	Hire Date	Overtime Hours	Sick Days Taken	Vacation Days Taken	Tı
со	unt	10.00000	10.000000	10.000000	10.000000	10.000000	10.000000	10	10.000000	10.000000	10.000000	10.
me	ean	1005.50000	40.500000	92332.000000	7.500000	3.000000	4220.700000	2016- 09-28 09:36:00	7.100000	3.300000	12.700000	28.
1	min	1001.00000	24.000000	60507.000000	1.000000	1.000000	1189.000000	2012- 09-05 00:00:00	0.000000	0.000000	6.000000	10.
2	25%	1003.25000	33.500000	65173.500000	5.250000	2.250000	1690.500000	2014- 06-12 06:00:00	1.500000	1.000000	8.000000	17.:
5	50%	1005.50000	42.500000	87173.500000	8.000000	3.000000	3482.000000	2016- 10-23 12:00:00	4.500000	2.500000	12.500000	30.
7	75%	1007.75000	46.000000	111094.000000	9.750000	4.000000	7001.750000	2019- 01-26 00:00:00	13.750000	6.500000	16.750000	37.
n	nax	1010.00000	58.000000	141721.000000	13.000000	4.000000	7973.000000	2020- 08-21 00:00:00	18.000000	7.000000	19.000000	49.1
	std	3.02765	10.276727	30916.484542	4.116363	1.054093	2839.564366	NaN	6.871034	2.945807	5.012207	13.

In [28]: df1.notnull()

Out[28]:

	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Education
0	True	True	True	True	True	True	True	True	True	True	True	True	True
1	True	True	True	True	True	True	True	True	True	True	True	True	True
2	True	True	True	True	True	True	True	True	True	True	True	True	True
3	True	True	True	True	True	True	True	True	True	True	True	True	True
4	True	True	True	True	True	True	True	True	True	True	True	True	True
5	True	True	True	True	True	True	True	True	True	True	True	True	True
6	True	True	True	True	True	True	True	True	True	True	True	True	True
7	True	True	True	True	True	True	True	True	True	True	True	True	True
8	True	True	True	True	True	True	True	True	True	True	True	True	True
9	True	True	True	True	True	True	True	True	True	True	True	True	True

In [29]: df1.isnull()

Out[29]:

	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Educatio
0	False	False	False	False	False	False	False	False	False	False	False	False	Fals
1	False	False	False	False	False	False	False	False	False	False	False	False	Fals
2	False	False	False	False	False	False	False	False	False	False	False	False	Fals
3	False	False	False	False	False	False	False	False	False	False	False	False	Fals
4	False	False	False	False	False	False	False	False	False	False	False	False	Fals
5	False	False	False	False	False	False	False	False	False	False	False	False	Fals
6	False	False	False	False	False	False	False	False	False	False	False	False	Fals
7	False	False	False	False	False	False	False	False	False	False	False	False	Fals
8	False	False	False	False	False	False	False	False	False	False	False	False	Fals
9	False	False	False	False	False	False	False	False	False	False	False	False	Fals

```
Out[30]: Employee ID
                                  10
          Employee Name
                                  10
          Department
                                  10
                                  10
          Age
          Location
                                  10
          Salary
Years with Company
                                   10
                                  10
          Position
                                  10
          Performance Score
                                  10
          Bonus
                                  10
          Gender
                                  10
          Marital Status
                                  10
          Education
                                  10
          Hire Date
                                  10
          Overtime Hours
                                  10
          Sick Days Taken
                                  10
          Vacation Days Taken
Training Hours
                                  10
                                  10
          Certifications
                                  10
          Supervisor
                                  10
          dtype: int64
```

```
In [ ]: df1.sum()
```

In [33]: print(df1)

```
Employee ID
                             Employee Name
                                               Department
                                                                       Location Salarv
                                                           Age
        0
                  1011
                             Satender Kumar Data Analyst
                                                            24
                                                                London, Canada
                                                                                  75719
        1
                  1012
                                    data 1
                                                       HR
                                                             40
                                                                    Los Angeles
                                                                                  96413
        2
                  1013
                               Chris Evans
                                                       IT
                                                            37
                                                                      New York
                                                                                  74042
                                                                        Chicago 108467
        3
                  1014
                           Natalie Portman
                                                Marketing
                                                            49
        4
                  1015
                               Tom Holland
                                                  Finance
                                                            27
                                                                        Houston
                                                                                  65822
        5
                  1016
                                Emma Watson
                                                    Sales
                                                             56
                                                                        Phoenix 114854
        6
                  1017
                          Daniel Radcliffe
                                                      R&D
                                                             33
                                                                   Philadelphia 117933
        7
                  1018
                        Scarlett Johansson
                                               Operations
                                                             41
                                                                    San Antonio
                                                                                 87342
        8
                  1019
                         Robert Downey Jr.
                                                    Legal
                                                             51
                                                                      San Diego
                                                                                  72775
        9
                  1020
                              Mark Ruffalo
                                                  Support
                                                             42
                                                                         Dallas 142745
           Years with Company
                                             Position Performance Score
                                                                          Bonus \
        0
                                         Data Analyst
                            12
                                                                        2
                                                                           3187
        1
                            12
                                           HR Manager
                                                                        1
                                                                           10993
                                        IT Specialist
        2
                           14
                                                                        4
                                                                           10834
                               Marketing Coordinator
        3
                            11
                                                                        4
                                                                            2760
                                                                        2
        4
                                    Financial Analyst
                                                                            6263
                            12
        5
                            5
                                       Sales Manager
                                                                        3
                                                                           10287
        6
                            17
                                   Research Scientist
                                                                        3
                                                                            8290
                            8
                                   Operations Manager
                                                                        3
                                                                           10047
        8
                            6
                                        Legal Advisor
                                                                        2
                                                                            6510
        9
                            10
                                   Support Specialist
                                                                            5533
           Gender Marital Status Education Hire Date Overtime Hours
        0
                                    Master 2018-07-15
                          Single
             Male
                                                                     17
        1
             Male
                         Married Bachelor 2014-03-22
                                                                      8
           Female
                                  Master 2011-10-12
        2
                          Single
                                                                     12
                                       PhD 2017-04-17
           Female
                          Single
                         Married Bachelor 2015-09-23
        4
             Male
                                                                     13
        5
                                   Master 2016-11-01
           Female
                          Single
                                                                     15
                                       PhD 2019-05-11
                                                                     8
        6
                          Sinale
             Male
        7
           Female
                         Married Bachelor 2020-07-08
                                                                     15
        8
                                    Master 2013-08-19
                                                                      7
             Male
                          Single
        9
             Male
                         Married
                                       PhD 2012-01-09
                                                                      2
           Sick Days Taken
                           Vacation Days Taken Training Hours Certifications \
        0
                         5
                                              12
                                                              21
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        1
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                                              18
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        3
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                                              20
                                                               42
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        4
                         6
                                                               35
                                              11
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        5
                         0
                                              20
                                                               35
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        6
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                                                               48
                         1
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        7
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                                               9
                                                               50
                                                                             Yes
        8
                         7
                                              20
                                                               35
                                                                             Yes
        9
                         4
                                              17
                                                               15
                                                                              No
                  Supervisor
        0
                  John Smith
        1
             Michael Johnson
           Patricia Williams
        2
        3
                 Linda Brown
        4
               Barbara Jones
        5
            Elizabeth Garcia
              Susan Martinez
        7
           Jessica Hernandez
        8
                 Sarah Lopez
        9
                Karen Wilson
In [36]: import pandas as pd
         # Assuming df and df1 are your DataFrames from the previous examples
         # Merging the two DataFrames on the 'Employee ID' column
         merged_df = pd.merge(df, df1, on='Employee ID', suffixes=('_df', '_df1'))
         # Display the merged DataFrame
         print(merged df)
        Empty DataFrame
```

Columns: [Employee ID, Employee Name\_df, Department\_df, Age\_df, Location\_df, Salary\_df, Years with Company\_df, P osition\_df, Performance Score\_df, Bonus\_df, Gender\_df, Marital Status\_df, Education\_df, Hire Date\_df, Overtime H ours\_df, Sick Days Taken\_df, Vacation Days Taken\_df, Training Hours\_df, Certifications\_df, Supervisor\_df, Employ ee Name\_df1, Department\_df1, Age\_df1, Location\_df1, Salary\_df1, Years with Company\_df1, Position\_df1, Performanc e Score\_df1, Bonus\_df1, Gender\_df1, Marital Status\_df1, Education\_df1, Hire Date\_df1, Overtime Hours\_df1, Sick D ays Taken\_df1, Vacation Days Taken\_df1, Training Hours\_df1, Certifications\_df1, Supervisor\_df1]
Index: []

[0 rows x 39 columns]

```
In [39]: merged_df = pd.merge(df, df1, on='Employee ID', suffixes=('_df', '_df1'), how='outer')
print(merged_df)
```

0 1 2	1001 1002 1003	mployee Name_df Satender Kumar data 1 Jane Smith	Data Analyst IT Finance	Age_df 24.0 46.0 48.0	Location_c London, Canac Toroni Londo	da to on	
3 4	1004 1005	Robert Brown Emily Davis	Marketing Sales	32.0 40.0	Sydne San Franciso	,	
5	1005	Michael Wilson	Operations	45.0	Pari		
6	1007	Sarah Taylor	R&D	58.0	Berli		
7	1008	David Lee	Support	28.0	Toky		
8	1009	Laura Johnson	Admin	38.0	Duba		
9	1010	James White	Legal	46.0	Singapo		
10 11	1011 1012	NaN NaN	NaN NaN	NaN NaN	Na Na		
12	1013	NaN	NaN	NaN	Na		
13	1014	NaN	NaN	NaN	Na		
14	1015	NaN	NaN	NaN	Na		
15	1016	NaN	NaN	NaN	Na		
16 17	1017 1018	NaN NaN	NaN NaN	NaN NaN	Na Na		
18	1019	NaN	NaN	NaN	Na		
19	1020	NaN	NaN	NaN	Na		
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0	Salary_df Ye 62989.0	ars with Company	y_dr	_	Performance So	core_df \ 4.0	\
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2	60507.0		1.0 A	nalyst		1.0	
3	71727.0			signer		3.0	
4	81098.0	:		ultant		3.0	
5 6	60924.0 116105.0			gineer entist		2.0 4.0	
7	138939.0	•	9.0 Support			3.0	
8	93249.0		7.0 Admin Ass	istant		4.0	
9	141721.0			Lawyer		2.0	
10 11	NaN NaN		NaN NaN	NaN NaN		NaN NaN	
12	NaN		NaN	NaN		NaN	
13	NaN		NaN	NaN		NaN	
14	NaN		NaN	NaN		NaN	
15	NaN		NaN	NaN		NaN	
16 17	NaN NaN		NaN NaN	NaN NaN		NaN NaN	
18	NaN		NaN	NaN		NaN	
19	NaN		NaN	NaN		NaN	
	Bonus df	Gender df1 Mar:	ital Status df1	Educati	on df1 Hire Da	ate df1 \	\
0	6419.0	NaN	NaN		NaN	NaT	`
1	4746.0	NaN	NaN		NaN	NaT	
2	1447.0	NaN	NaN		NaN	NaT	
3 4	7196.0 2218.0	NaN NaN	NaN NaN		NaN NaN	NaT NaT	
5	7973.0	NaN	NaN		NaN	NaT	
6	7565.0	NaN	NaN		NaN	NaT	
7	1800.0	NaN	NaN		NaN	NaT	
8 9	1189.0	NaN	NaN		NaN		
10	1654.0	NaN	NaM			NaT	
	NaN	NaN Male	NaN Single		NaN	NaT	
11	NaN NaN	NaN Male Male	NaN Single Married		NaN Master 2018		
12		Male	Single	Ва	NaN Master 2018 Ichelor 2014	NaT 3-07-15	
12 13	NaN NaN NaN	Male Male Female Female	Single Married Single Single	Ва	NaN Master 2018 Achelor 2014 Master 2017 PhD 2017	NaT 3-07-15 4-03-22 1-10-12 7-04-17	
12 13 14	NaN NaN NaN NaN	Male Male Female Female Male	Single Married Single Single Married	Ba Ba	NaN Master 2018 Ichelor 2014 Master 2011 PhD 2017 Ichelor 2015	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23	
12 13	NaN NaN NaN	Male Male Female Female	Single Married Single Single	Ba Ba	NaN Master 2018 chelor 2014 Master 2017 PhD 2017 chelor 2018 Master 2016	NaT 3-07-15 4-03-22 1-10-12 7-04-17	
12 13 14 15	NaN NaN NaN NaN	Male Male Female Female Male Female	Single Married Single Single Married Single	Ba Ba	NaN Master 2018 Chelor 2014 Master 2017 PhD 2017 Chelor 2018 Master 2016 PhD 2019	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01	
12 13 14 15 16 17 18	NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Female Male	Single Married Single Single Married Single Married Single	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2026 Master 2016	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 5-11-01 9-05-11 9-07-08 3-08-19	
12 13 14 15 16 17	NaN NaN NaN NaN NaN NaN	Male Male Female Female Male Female Male Female	Single Married Single Single Married Single Single Married	Ba Ba Ba	NaN Master 2018 Chelor 2014 Master 2017 PhD 2017 Chelor 2016 Master 2016 PhD 2019 Chelor 2026 Master 2026 Master 2016	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08	
12 13 14 15 16 17 18	NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female	Single Married Single Single Married Single Married Single	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2016 PhD 2017	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Male Male Male	Single Married Single Single Married Single Single Married Single Married Single Married	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2016 Achelor 2026 Achelor 2026 Achelor 2016 Achelor 20	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Male Male Male Male	Single Married Single Single Married Single Single Married Single Married Single Married	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2028 Achelor 2028 Achelor 2028 Achelor 2018 Ach	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Famale Male Male Male Male Male Male Male	Single Married Single Single Married Single Single Married Single Married Single Married Nan	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2028 Achelor 2028 Achelor 2028 Achelor 2018 Ach	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Male Male Male Male	Single Married Single Single Married Single Single Married Single Married Single Married	Ba Ba Ba	NaN Master 2018 Achelor 2017 Master 2017 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2018 Achelor 2028 Achelor 2028 Achelor 2028 Achelor 2018 Ach	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Semale Male Male Male Male Male Male Male M	Single Married Single Single Married Single Single Married Single Married Single Married Nan NaN NaN NaN NaN NaN NaN	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2018 Achel	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Famale Male Sale Male Male Male Male Male Male Male M	Single Married Single Single Married Single Single Married Single Married Single Married Nan	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 PhD 2012 Achelor 2026 Master 2013 PhD 2012 Achelor A	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 7	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Semale Male Male Male Male Male Male Male M	Single Married Single Single Single Married Single Married Single Married Single Married Nan	Ba Ba Ba	NaN Master 2018 Achelor 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 PhD 2012 Achelor 2026 Master 2013 PhD 2012 Achelor Achelor Achelor NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 7 8	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male S_df1 Sick Days NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Single Married Single Single Single Married Single Married Single Married Single Married Nan	Ba Ba Ba	NaN Master 2018 Achelor 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 Achelor 2026 Master 2017 Ann 2017 Ann NaN	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 7	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Semale Male Male Male Male Male Male Male M	Single Married Single Single Single Married Single Married Single Married Single Married Nan	Ba Ba Ba	NaN Master 2018 Achelor 2017 PhD 2017 Achelor 2018 Master 2016 PhD 2019 Achelor 2026 Master 2016 PhD 2012 Achelor 2026 Master 2013 PhD 2012 Achelor Achelor Achelor NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 7 8 9 10 11	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Sale Male Male Male Male Male Male Male M	Single Married Single Single Single Single Single Single Married Single Married Single Married Single Married NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2016 Master 2016 PhD 2016 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2017 Ann NaN NaN NaN NaN NaN NaN NaN NaN NaN N	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 6 7 8 9 10 11 12	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Salf1 Sick Days NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Single Married Single Single Single Single Single Single Married Single Married Single Married Single Married NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2016 Master 2016 PhD 2016 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2017 Ann NaN NaN NaN NaN NaN NaN NaN NaN NaN N	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 6 7 8 9 10 11 12 13	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Saldf1 Sick Days NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Single Married Single Single Single Single Single Single Married Single Married Single Married Single Married NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2016 Achel	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	
12 13 14 15 16 17 18 19 0 1 2 3 4 5 6 6 7 8 9 10 11 12	NaN          NaN          NaN          NaN          NaN          NaN          NaN          NaN	Male Male Female Female Male Female Male Female Male Female Male Salf1 Sick Days NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Single Married Single Single Single Single Single Single Married Single Married Single Married Single Married NaN NaN NaN NaN NaN NaN NaN NaN NaN Na	Ba Ba Ba	NaN  Master 2018 Achelor 2017 PhD 2017 Achelor 2016 Master 2016 PhD 2016 Achelor 2026 Master 2016 PhD 2017 Achelor 2026 Master 2017 Ann NaN NaN NaN NaN NaN NaN NaN NaN NaN N	NaT 3-07-15 4-03-22 1-10-12 7-04-17 5-09-23 6-11-01 9-05-11 9-07-08 3-08-19 2-01-09	

```
17
                           15.0
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        18
                            7.0
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        19
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            Training Hours_df1 Certifications_df1
                                                        Supervisor_df1
        0
                            NaN
        1
                            NaN
                                               NaN
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        9
                           NaN
                                               NaN
                                                                   NaN
        10
                           21.0
                                               Yes
                                                            John Smith
                                                      Michael Johnson
                           41.0
        11
                                               Yes
        12
                           22.0
                                                No Patricia Williams
                           42.0
        13
                                               Yes
                                                          Linda Brown
        14
                           35.0
                                                No
                                                         Barbara Jones
        15
                           35.0
                                               Yes
                                                     Elizabeth Garcia
        16
                           48.0
                                                No
                                                        Susan Martinez
        17
                           50.0
                                                    Jessica Hernandez
                                               Yes
        18
                           35.0
                                               Yes
                                                           Sarah Lopez
        19
                           15.0
                                                          Karen Wilson
                                                No
        [20 rows x 39 columns]
In [43]: print(df['Employee ID'])
         print(df1['Employee ID'])
             1001
             1002
        2
             1003
        3
             1004
        4
             1005
        5
             1006
        6
             1007
        7
             1008
        8
             1009
        9
             1010
        Name: Employee ID, dtype: int32
        0
             1011
        1
             1012
        2
             1013
        3
             1014
        4
             1015
        5
             1016
        6
             1017
        7
             1018
        8
             1019
             1020
        Name: Employee ID, dtype: int32
In [45]: df
```

16

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1.0

15.0

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4	e Ma
Ę	i F
6	d Bach
7	e Ma
8	d Bach
ę	e Ma
7	) 

In [46]: df1

Out[46]:

	Employee ID	Employee Name	Department	Age	Location	Salary	Years with Company	Position	Performance Score	Bonus	Gender	Marital Status	Edu
0	1011	Satender Kumar	Data Analyst	24	London, Canada	75719	12	Data Analyst	2	3187	Male	Single	
1	1012	data 1	HR	40	Los Angeles	96413	12	HR Manager	1	10993	Male	Married	В
2	1013	Chris Evans	IT	37	New York	74042	14	IT Specialist	4	10834	Female	Single	
3	1014	Natalie Portman	Marketing	49	Chicago	108467	11	Marketing Coordinator	4	2760	Female	Single	
4	1015	Tom Holland	Finance	27	Houston	65822	12	Financial Analyst	2	6263	Male	Married	В
5	1016	Emma Watson	Sales	56	Phoenix	114854	5	Sales Manager	3	10287	Female	Single	
6	1017	Daniel Radcliffe	R&D	33	Philadelphia	117933	17	Research Scientist	3	8290	Male	Single	
7	1018	Scarlett Johansson	Operations	41	San Antonio	87342	8	Operations Manager	3	10047	Female	Married	В
8	1019	Robert Downey Jr.	Legal	51	San Diego	72775	6	Legal Advisor	2	6510	Male	Single	
9	1020	Mark Ruffalo	Support	42	Dallas	142745	10	Support Specialist	1	5533	Male	Married	

## In [50]: print(pd.concat([df,df1]))

	Employee ID Employee Name		Department Age		Location	Salary
0	1001	Satender Kumar	Data Analyst	24	London, Canada	62989
1	1002	data 1	IT	46	Toronto	96061
2	1003	Jane Smith	Finance	48	London	60507
3	1004	Robert Brown	Marketing	32	Sydney	71727
4	1005	Emily Davis	Sales	40	San Francisco	81098
5	1006	Michael Wilson	Operations	45	Paris	60924
6	1007	Sarah Taylor	R&D	58	Berlin	116105
7	1008	David Lee	Support	28	Tokyo	138939
8	1009	Laura Johnson	Admin	38	Dubai	93249
9	1010	James White	Legal	46	Singapore	141721
0	1011	Satender Kumar	Data Analyst	24	London, Canada	75719
1	1012	data 1	HR	40	Los Angeles	96413
2	1013	Chris Evans	IT	37	New York	74042
3	1014	Natalie Portman	Marketing	49	Chicago	108467
4	1015	Tom Holland	Finance	27	Houston	65822
5	1016	Emma Watson	Sales	56	Phoenix	114854

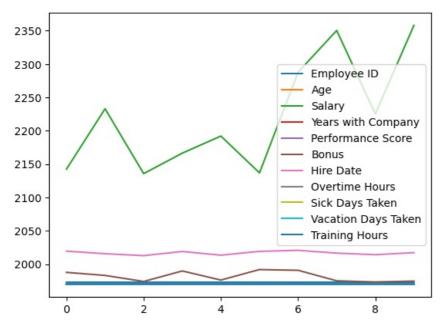
6 7	1017 1018	Daniel Scarlett	Radcliffe Johansson	R Operatio	&D 33	Philadelphia San Antonio	
8 9	1019 1020		owney Jr. k Ruffalo	Leg Suppo		San Diego Dallas	
0	Years with Co		Data		Performand		
0 1		10 5		Analyst eveloper		4 641 4 474	
2		1		Analyst		1 144	7
3 4		9	Ca	Designer		3 719 3 221	
5		13 6	Co	nsultant Engineer		2 797	
6		13	S	cientist		4 756	
7		9		rt Agent		3 180	
8		7	Admin A	ssistant		4 118	
9 0		2 12	Data	Lawyer Analyst		2 165 2 318	
1		12		Manager		1 1099	
2		14		ecialist		4 1083	
3			rketing Coo			4 276	
4 5		12 5	Financial Sales	Manager		2 626 3 1028	
6		17	Research S	3		3 829	
7		8	Operations	-		3 1004	
8 9		6	_	Advisor		2 651 1 553	
9		10	Support Sp	ecialist		1 553	3
	Gender Marita	l Status	Education	Hire Date	0vertime	Hours \	
0	Male	Single	Bachelor 2			10	
1 2	Male	Single		015-07-23		15	
3	Female Male	Married Single	Bachelor 2	012-09-05 018-11-30		0 18	
4	Female	Single		013-05-19		1	
5	Male	Married		019-02-14		0	
6	Female	Married	Bachelor 2			3	
7 8	Male Female	Single Married	Master 2 Bachelor 2	016-06-03		6 15	
9	Male	Single		017-03-15		3	
0	Male	Single		018-07-15		17	
1	Male	Married	Bachelor 2			8	
2	Female Female	Single Single		011-10-12 017-04-17		12 10	
4	Male	Married	Bachelor 2			13	
5	Female	Single		016-11-01		15	
6	Male	Single		019-05-11		8	
7 8	Female Male	Married Single	Bachelor 2	1020-07-08		15 7	
9	Male	Married		012-01-09		2	
	Sick Days Tak	en Vacat	ion Days Ta	ken Train	ing Hours	Certification	s \
0	,	2	,	19	15	Ye	
1		7		14	31	N	
2		5 3		7 11	37 12	Ye N	
4		7		17	30	Ye	
5		1		16	24	N	
6		0		7	49	Ye	
7 8		0 1		6 11	10 38	Ye N	
9		7		19	40	Ye	
0		5		12	21	Ye	
1 2		3 4		18 8	41 22	Ye	
3		4 7		8 20	42	N Ye	
4		6		11	35	N	
5		0		20	35	Ye	
6 7		1 7		15	48 50	N Vo	
8		7 7		9 20	50 35	Ye Ye	
9		4		17	15	N	
	Superv	isor					
0	Anna S						
1	Brian A						
2	Clara Jones Daniel Martin						
4	Eva Rodriguez						
5	Frank Bell						
6	Grace Moore						
7	Hannah Lewis Ivan Scott						
8 9	Ivan S Jake Mi						
0	John S						

```
Michael Johnson
        2
           Patricia Williams
                 Linda Brown
        3
        4
               Barbara Jones
            Elizabeth Garcia
              Susan Martinez
           Jessica Hernandez
                 Sarah Lopez
        8
                Karen Wilson
In [52]: df.info()
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 10 entries, 0 to 9
        Data columns (total 20 columns):
         #
             Column
                                  Non-Null Count
                                                  Dtype
        - - -
                                  -----
        0
             Employee ID
                                  10 non-null
                                                   int32
             Employee Name
                                  10 non-null
         1
                                                   object
             Department
                                  10 non-null
                                                   object
                                  10 non-null
         3
             Age
                                                   int64
         4
             Location
                                  10 non-null
                                                   object
         5
             Salary
                                  10 non-null
                                                   int32
         6
             Years with Company
                                  10 non-null
                                                   int32
                                  10 non-null
         7
             Position
                                                   object
         8
             Performance Score
                                  10 non-null
                                                   int32
         9
             Bonus
                                  10 non-null
                                                   int32
         10
             Gender
                                  10 non-null
                                                   object
             Marital Status
                                  10 non-null
         11
                                                   object
             Education
                                  10 non-null
                                                   object
                                  10 non-null
            Hire Date
                                                   datetime64[ns]
         13
         14
             Overtime Hours
                                  10 non-null
                                                   int32
                                  10 non-null
         15 Sick Days Taken
                                                   int32
         16 Vacation Days Taken
                                  10 non-null
                                                   int32
         17 Training Hours
                                  10 non-null
                                                   int32
         18
            Certifications
                                  10 non-null
                                                   object
         19 Supervisor
                                  10 non-null
                                                   obiect
        dtypes: datetime64[ns](1), int32(9), int64(1), object(9)
```

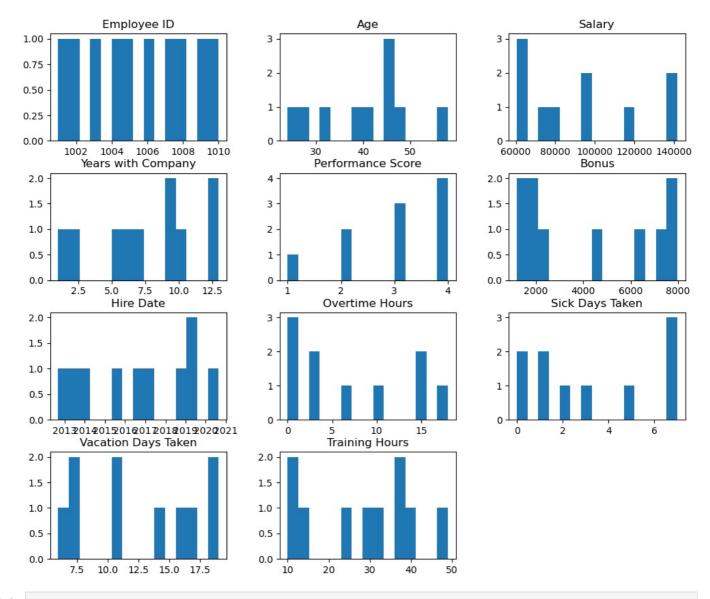
## In [55]: df.plot()

memory usage: 1.3+ KB

## Out[55]: <Axes: >



```
In [57]: df.hist(figsize=(12, 10), bins=15, grid=False)
# Display the plots
plt.show()
```



In [ ]:

Loading [MathJax]/jax/output/CommonHTML/fonts/TeX/fontdata.js