```
[INFO] [2025-10-29
[INFO] [2025-10-29
[INFO] [2025-10-29 Dataset shape: (1000, 20)
[INFO] [2025-10-29 Columns: ['Age', 'Sex', 'Job', 'Housing', 'Saving accounts', 'Checking account', 'Credit amount', 'Duration', 'Purpose', 'Risk']
[INFO] [2025-10-29 Missing values:
Age                 0
Sex                 0
Job                 0
Housing             0
Saving accounts     0
Checking account    0
Credit amount       0
Duration            0
Purpose             0
Risk                0
dtype: int64
[INFO] [2025-10-29 Duplicate rows: 0
[INFO] [2025-10-29 Dropped 0 duplicate rows.
[INFO] [2025-10-29 Dropped 0 rows with missing values.
[INFO] [2025-10-29 Cleaned dataset shape: (1000, 20)
[INFO] [2025-10-29 Saved cleaned dataset to data/processed/cleaned_data.csv
[INFO] [2025-10-29 Generating visualizations...
[INFO] [2025-10-29 Saved plot: plots/target_distribution.
[INFO] [2025-10-29 Saved plot: plots/age_distribution.
[INFO] [2025-10-29 Saved plot: plots/credit_amount_distribution.
[INFO] [2025-10-29 Saved plot: plots/duration_distribution.
[INFO] [2025-10-29 Saved plot: plots/age_credit_scatter.
[INFO] [2025-10-29 Saved plot: plots/age_duration_scatter.
[INFO] [2025-10-29 Saved plot: plots/credit_duration_scatter.
[INFO] [2025-10-29 Saved plot: plots/age_by_risk.
[INFO] [2025-10-29 Saved plot: plots/credit_amount_by_risk.
[INFO] [2025-10-29 Saved plot: plots/duration_by_risk.
[INFO] [2025-10-29 Saved plot: plots/correlation_heatmap.
[INFO] [2025-10-29 Saved plot: plots/pairplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_violin.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_violin.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_hexbin.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_hexbin.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_kde.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_kde.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_joint.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_joint.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_regplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_regplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_residplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_residplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_rugplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_rugplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_ecdf.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_ecdf.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_boxplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_boxplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_stripplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_stripplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_swarmplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_swarmplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_barplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_barplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_pointplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_pointplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_countplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_countplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_catplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_catplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_lmplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_lmplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_jointplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_jointplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_pairplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_pairplot.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_clustermap.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_clustermap.
[INFO] [2025-10-29 Saved plot: plots/age_vs_credit_heatmap.
[INFO] [2025-10-29 Saved plot: plots/age_vs_duration_heatmap
```