RMSE and MAE in one table for Report

In [1]:

```python
# --- Load RMSE/MAE CSVs from FD001–FD004 artefact folders ---
# Run this from your project root (e.g., ".../Msc-Project-main").
# If your notebook is elsewhere, set ROOT to the absolute path shown below.

import re
from pathlib import Path
import pandas as pd

# If the notebook is in "Msc-Project-main", this is fine:
ROOT = Path.cwd()

# Otherwise, uncomment and paste your path:
# ROOT = Path(r"C:\Users\mg020649\Documents\15 - Coding\Msc-Project-main")

DATASET_DIR_PATTERN = re.compile(r"(FD\d{3})\s*data\s*&\s*artefacts", re.IGNORECASE)
CSV_NAME_HINTS = ("rmse", "mae", "metric", "result", "eval", "performance")

def find_fd_artifact_dirs(root: Path) -> dict:
    """Map 'FD001'..'FD004' -> Path('FD001 data & artefacts'), etc."""
    dirs = {}
    for p in root.iterdir():
        if p.is_dir():
            m = DATASET_DIR_PATTERN.search(p.name)
            if m:
                ds = m.group(1).upper()
                dirs[ds] = p
    return dict(sorted(dirs.items()))

def load_metrics_from_dir(ds_dir: Path) -> pd.DataFrame:
    """
    Load all CSVs in a dataset's artefacts folder that look like metrics files.
    Normalises common column names to: model, RMSE, MAE.
    """
    frames = []
    for csv_path in ds_dir.rglob("*.csv"):
        # Skip obviously unrelated CSVs by filename
        name_l = csv_path.name.lower()
        if not any(k in name_l for k in CSV_NAME_HINTS):
            continue
        try:
            df = pd.read_csv(csv_path)
```

```
        except Exception:
            continue

        # Normalise column names
        rename_map = {}
        for c in df.columns:
            cl = c.strip().lower()
            if cl in {"model", "models", "name"}:
                rename_map[c] = "model"
            elif cl in {"rmse", "root_mse", "root mean square error"}:
                rename_map[c] = "RMSE"
            elif cl in {"mae", "mean_abs_error", "mean absolute error"}:
                rename_map[c] = "MAE"
        if rename_map:
            df = df.rename(columns=rename_map)

        df["source_file"] = csv_path.name
        df["source_path"] = str(csv_path)
        frames.append(df)

    return pd.concat(frames, ignore_index=True) if frames else pd.DataFrame()

def load_all_fd_metrics(root: Path = ROOT) -> dict:
    """Return dict like {'FD001': df, 'FD002': df, ...} of loaded metrics CSVs."""
    datasets = {}
    for ds, path in find_fd_artifact_dirs(root).items():
        df = load_metrics_from_dir(path)
        if not df.empty:
            df.insert(0, "Dataset", ds)
            datasets[ds] = df
            print(f"✓ {ds}: loaded {df.shape[0]} rows from {path}")
        else:
            print(f"⚠️ {ds}: no metrics-looking CSVs found under {path}")
    return datasets

# Load
all_metrics = load_all_fd_metrics()

# Example: peek at FD001 (if present)
if "FD002" in all_metrics:
    display(all_metrics["FD002"].head())

```

```
# (optional) Combine everything for later plotting
# combined_metrics = pd.concat(all_metrics.values(), ignore_index=True)
# display(combined_metrics.head())
```

```
✓ FD001: loaded 4 rows from C:\Users\mg020649\Documents\15 - Coding\Msc-Project-main\FD001 data & artefacts
✓ FD002: loaded 4 rows from C:\Users\mg020649\Documents\15 - Coding\Msc-Project-main\FD002 data & artefacts
✓ FD003: loaded 4 rows from C:\Users\mg020649\Documents\15 - Coding\Msc-Project-main\FD003 data & artefacts
✓ FD004: loaded 4 rows from C:\Users\mg020649\Documents\15 - Coding\Msc-Project-main\FD004 data & artefacts
```

	Dataset	model	RMSE	MAE	source_file	source_path
0	FD002	LSTM	21.90	16.77	fd002_metrics_seq30.csv	C:\Users\mg020649\Documents\15 - Coding\Msc-Pr...
1	FD002	CNN-LSTM	22.68	16.87	fd002_metrics_seq30.csv	C:\Users\mg020649\Documents\15 - Coding\Msc-Pr...
2	FD002	CNN	24.23	19.52	fd002_metrics_seq30.csv	C:\Users\mg020649\Documents\15 - Coding\Msc-Pr...
3	FD002	Base	24.29	19.70	fd002_metrics_seq30.csv	C:\Users\mg020649\Documents\15 - Coding\Msc-Pr...

In [2]:

```python
# --- Combine all FD00x metrics into a clean, presentation-ready DataFrame ---
# Assumes you already ran the previous cell and have `all_metrics` (dict of DataFrames).
# If not, we try to load them again from disk.

import pandas as pd

def _ensure_loaded(all_metrics_dict=None):
    try:
        # if previous cell defined it
        if isinstance(all_metrics_dict, dict) and all_metrics_dict:
            return all_metrics_dict
    except NameError:
        pass
    # fallback: call the loader from the previous cell (must exist in the notebook)
    return load_all_fd_metrics(ROOT)

def build_presentation_metrics(all_metrics_dict=None, decimals=2) -> pd.DataFrame:
    all_metrics_dict = _ensure_loaded(all_metrics_dict)
    if not all_metrics_dict:
        raise RuntimeError("No metrics found. Run the loading cell first.")

    # Concatenate and keep only the essential columns
    df = pd.concat(all_metrics_dict.values(), ignore_index=True)

    # Standardise column names if needed
    rename_map = {c: c.strip() for c in df.columns}
    df = df.rename(columns=rename_map)
    # Common variants
    if "model" not in df.columns and "Model" in df.columns:
        df = df.rename(columns={"Model": "model"})
    if "RMSE" not in df.columns:
        # try lower-case
        if "rmse" in df.columns: df = df.rename(columns={"rmse": "RMSE"})
    if "MAE" not in df.columns:
        if "mae" in df.columns: df = df.rename(columns={"mae": "MAE"})
    if "Dataset" not in df.columns and "dataset" in df.columns:
        df = df.rename(columns={"dataset": "Dataset"})

    # Keep only the key columns and coerce numerics
    keep = [c for c in ["Dataset", "model", "RMSE", "MAE"] if c in df.columns]
    df = df[keep].copy()
```

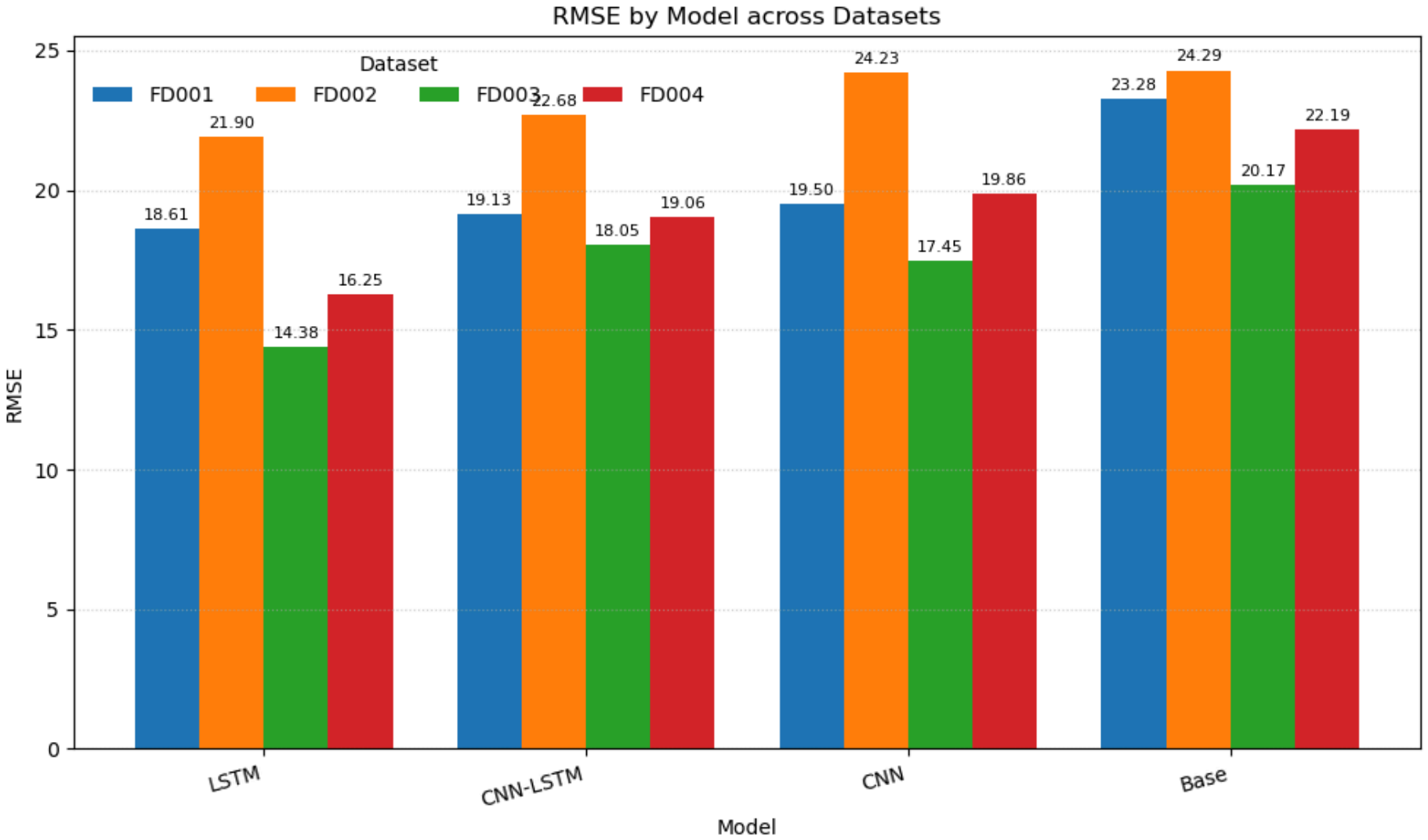
```
    for c in ("RMSE", "MAE"):
        if c in df.columns:
            df[c] = pd.to_numeric(df[c], errors="coerce")

    # Drop duplicates and rows missing both metrics
    if "RMSE" in df.columns and "MAE" in df.columns:
        df = df.dropna(subset=["RMSE", "MAE"], how="all")
    df = df.drop_duplicates()

    # Round and sort for nicer presentation
    if "RMSE" in df.columns: df["RMSE"] = df["RMSE"].round(decimals)
    if "MAE"  in df.columns: df["MAE"]  = df["MAE"].round(decimals)

    # Order columns and rows
    ordered_cols = [c for c in ["Dataset", "model", "RMSE", "MAE"] if c in df.columns]
    df = df[ordered_cols].sort_values(by=["Dataset", "RMSE" if "RMSE" in df.columns else ordered_cols[-1]],
                                      ascending=[True, True]).reset_index(drop=True)

    # Tidy up model names (optional)
    if "model" in df.columns:
        df["model"] = df["model"].str.replace("_", "-").str.replace("cnn lstm", "CNN-LSTM", case=False)

    return df

presentation_df = build_presentation_metrics(all_metrics)
display(presentation_df)
# Optionally save for the report/appendix:
# presentation_df.to_csv("all_fd_metrics_clean.csv", index=False)
```

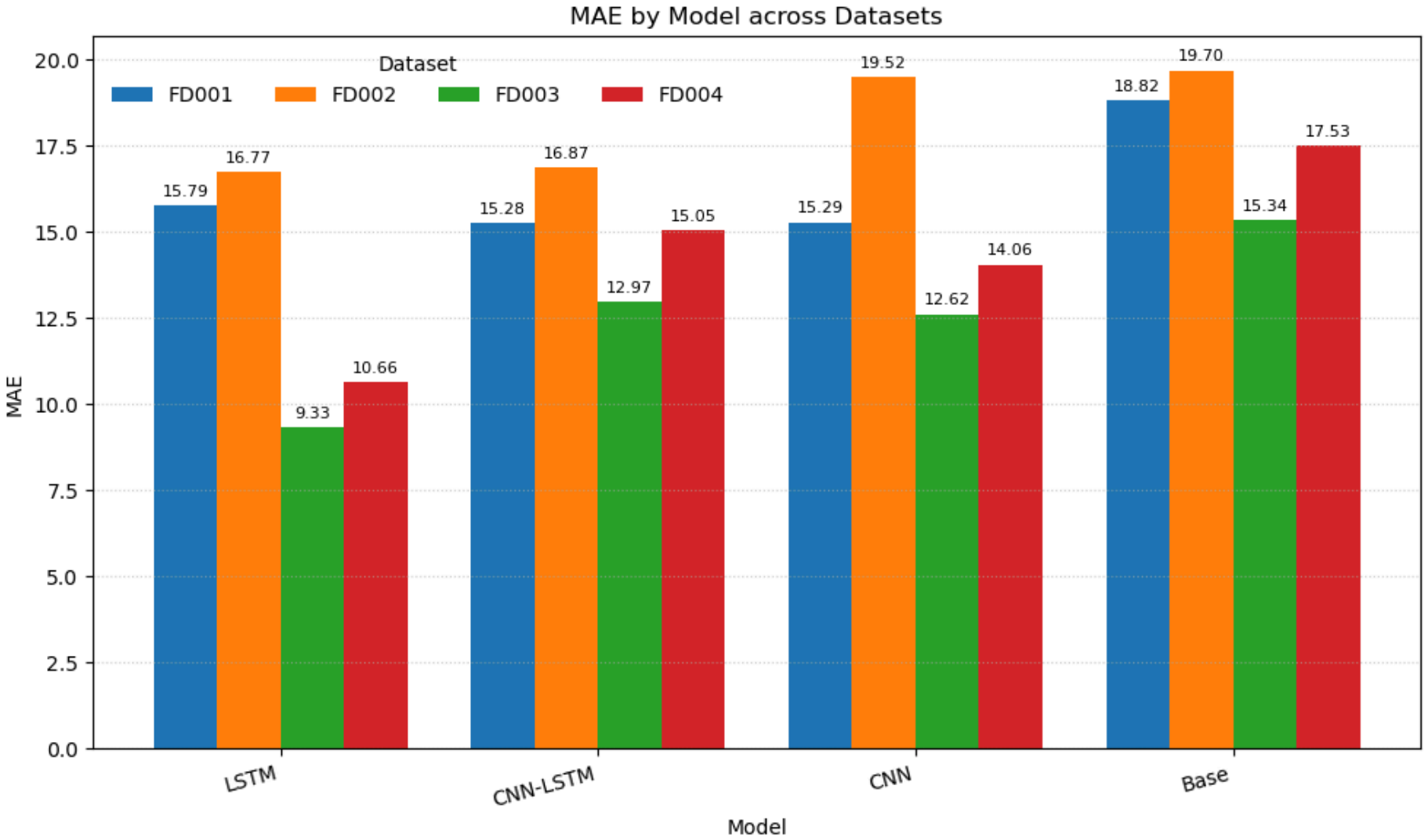
	Dataset	model	RMSE	MAE
0	FD001	LSTM	18.61	15.79
1	FD001	CNN-LSTM	19.13	15.28
2	FD001	CNN	19.50	15.29
3	FD001	Base	23.28	18.82
4	FD002	LSTM	21.90	16.77
5	FD002	CNN-LSTM	22.68	16.87
6	FD002	CNN	24.23	19.52
7	FD002	Base	24.29	19.70
8	FD003	LSTM	14.38	9.33
9	FD003	CNN	17.45	12.62
10	FD003	CNN-LSTM	18.05	12.97
11	FD003	Base	20.17	15.34
12	FD004	LSTM	16.25	10.66
13	FD004	CNN-LSTM	19.06	15.05
14	FD004	CNN	19.86	14.06
15	FD004	Base	22.19	17.53

In [3]:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

# ---- Grouped bar chart: models on X, one colour per FD00X ----
def plot_metric_by_dataset(df: pd.DataFrame, metric: str = "RMSE",
                           palette: dict | None = None,
                           figsize=(10, 6), savepath: str | None = None):
    """
    df: tidy DataFrame with columns ['Dataset','model','RMSE','MAE'] (from presentation_df)
    metric: 'RMSE' or 'MAE'
    palette: optional dict mapping dataset -> color
    """
    assert metric in {"RMSE", "MAE"}, "metric must be 'RMSE' or 'MAE'"

    # Keep the necessary cols and pivot to wide for grouped bars
    work = df[["Dataset", "model", metric]].copy()
    # order models by their mean metric (lower is better)
    model_order = (work.groupby("model")[metric]
                   .mean().sort_values(ascending=True).index.tolist())
    datasets = sorted(work["Dataset"].unique())

    wide = (work.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
            .reindex(model_order))

    # default palette if none provided
    if palette is None:
        # consistent mapping FD001..FD004
        base_colors = plt.cm.tab10.colors  # 10 distinct colors
        palette = {ds: base_colors[i % len(base_colors)] for i, ds in enumerate(datasets)}

    # plot
    fig, ax = plt.subplots(figsize=figsize)
    n_models = len(wide.index)
    n_ds = len(datasets)
    x = np.arange(n_models)
    width = 0.8 / n_ds  # total bar group width ~0.8

    for i, ds in enumerate(datasets):
        values = wide[ds].values
        bar = ax.bar(x + i*width - (n_ds-1)*width/2, values, width,
```

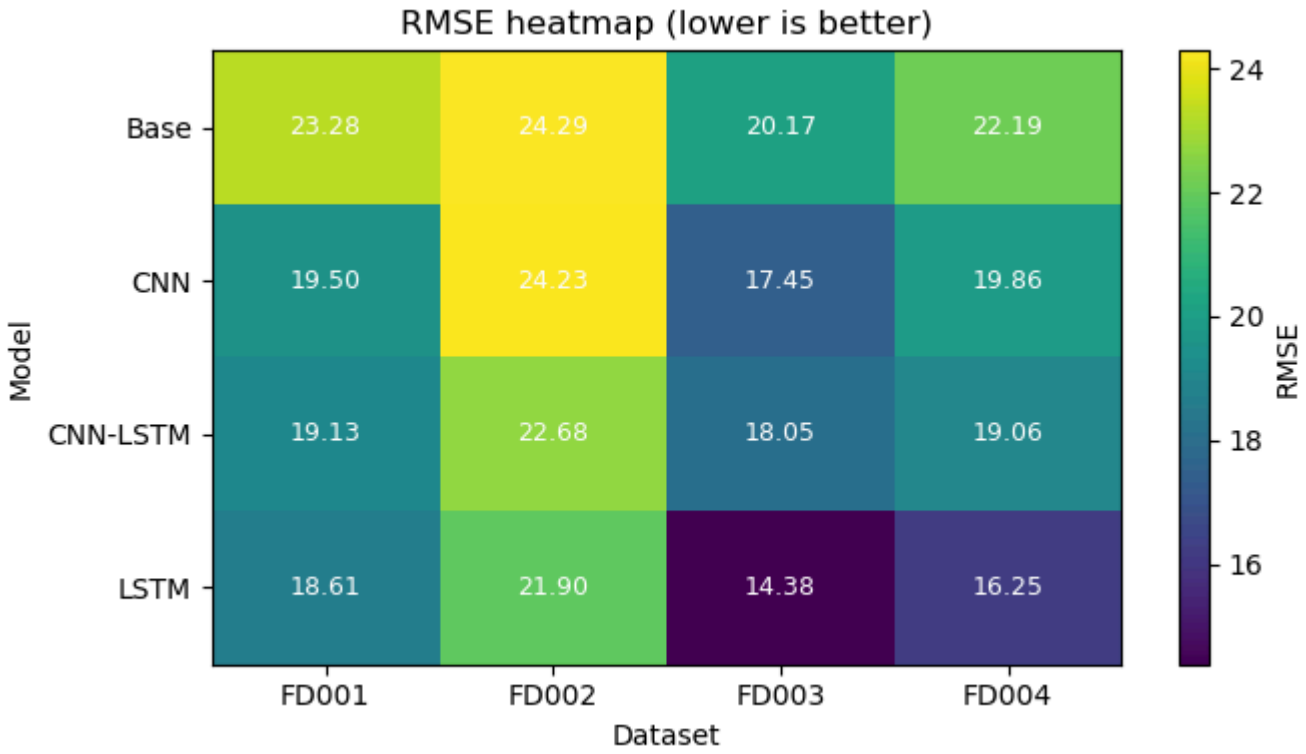
```
                      label=ds, color=palette.get(ds))
        # add value labels
        for rect in bar:
            h = rect.get_height()
            ax.annotate(f"{h:.2f}", xy=(rect.get_x() + rect.get_width()/2, h),
                        xytext=(0, 3), textcoords="offset points",
                        ha="center", va="bottom", fontsize=8)

    ax.set_xticks(x)
    ax.set_xticklabels(wide.index, rotation=15, ha="right")
    ax.set_ylabel(metric)
    ax.set_xlabel("Model")
    ax.set_title(f"{metric} by Model across Datasets")
    ax.grid(axis="y", linestyle=":", alpha=0.6)
    ax.legend(title="Dataset", ncols=min(4, n_ds), frameon=False)
    fig.tight_layout()

    if savepath:
        fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# ---- Usage (assumes `presentation_df` exists from previous cell) ----
plot_metric_by_dataset(presentation_df, metric="RMSE")
plot_metric_by_dataset(presentation_df, metric="MAE")
```

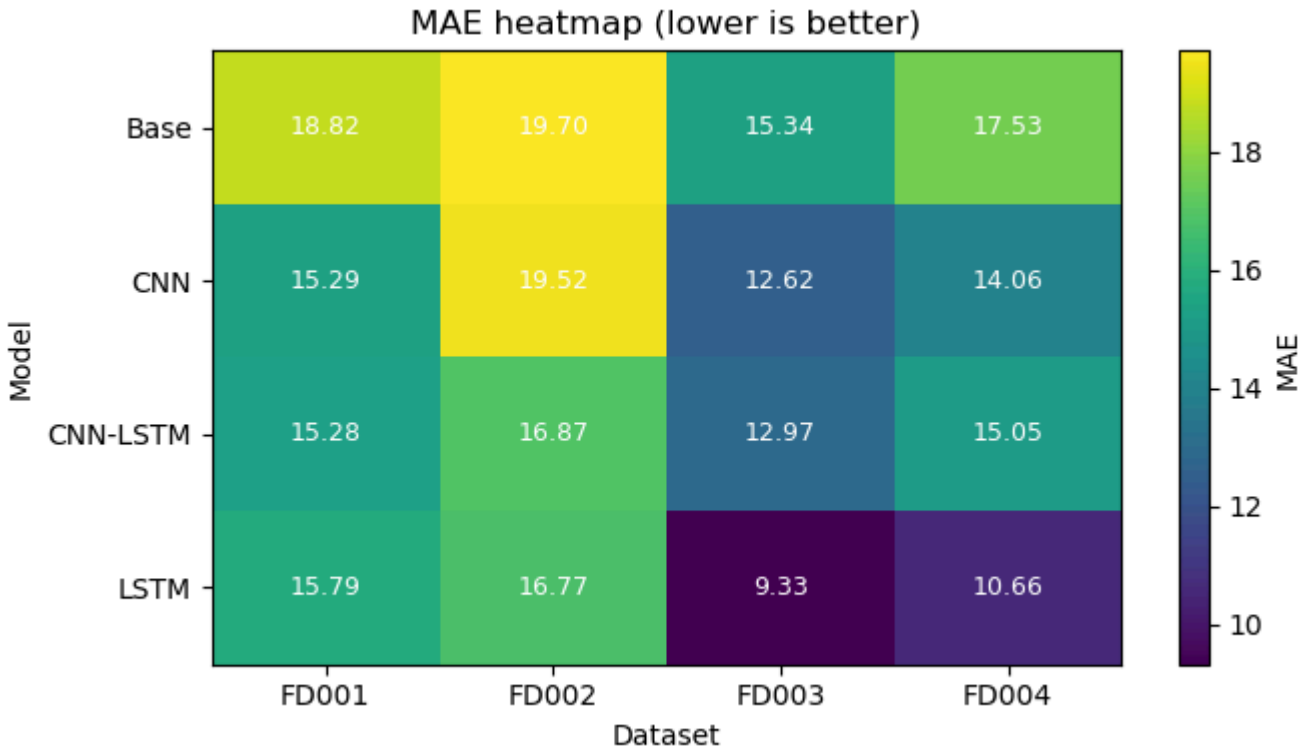

RMSE by Model across Datasets
Dataset
FD001
FD002
FD003
FD004
RMSE
Model
LSTM
CNN-LSTM
CNN
Base
0
5
10
15
20
25
18.61
21.90
14.38
16.25
19.13
22.68
18.05
19.06
19.50
24.23
17.45
19.86
23.28
24.29
20.17
22.19


MAE by Model across Datasets
Dataset
FD001
FD002
FD003
FD004
MAE
Model
LSTM
CNN-LSTM
CNN
Base
15.79
16.77
9.33
10.66
15.28
16.87
12.97
15.05
15.29
19.52
12.62
14.06
18.82
19.70
15.34
17.53
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

In [4]:

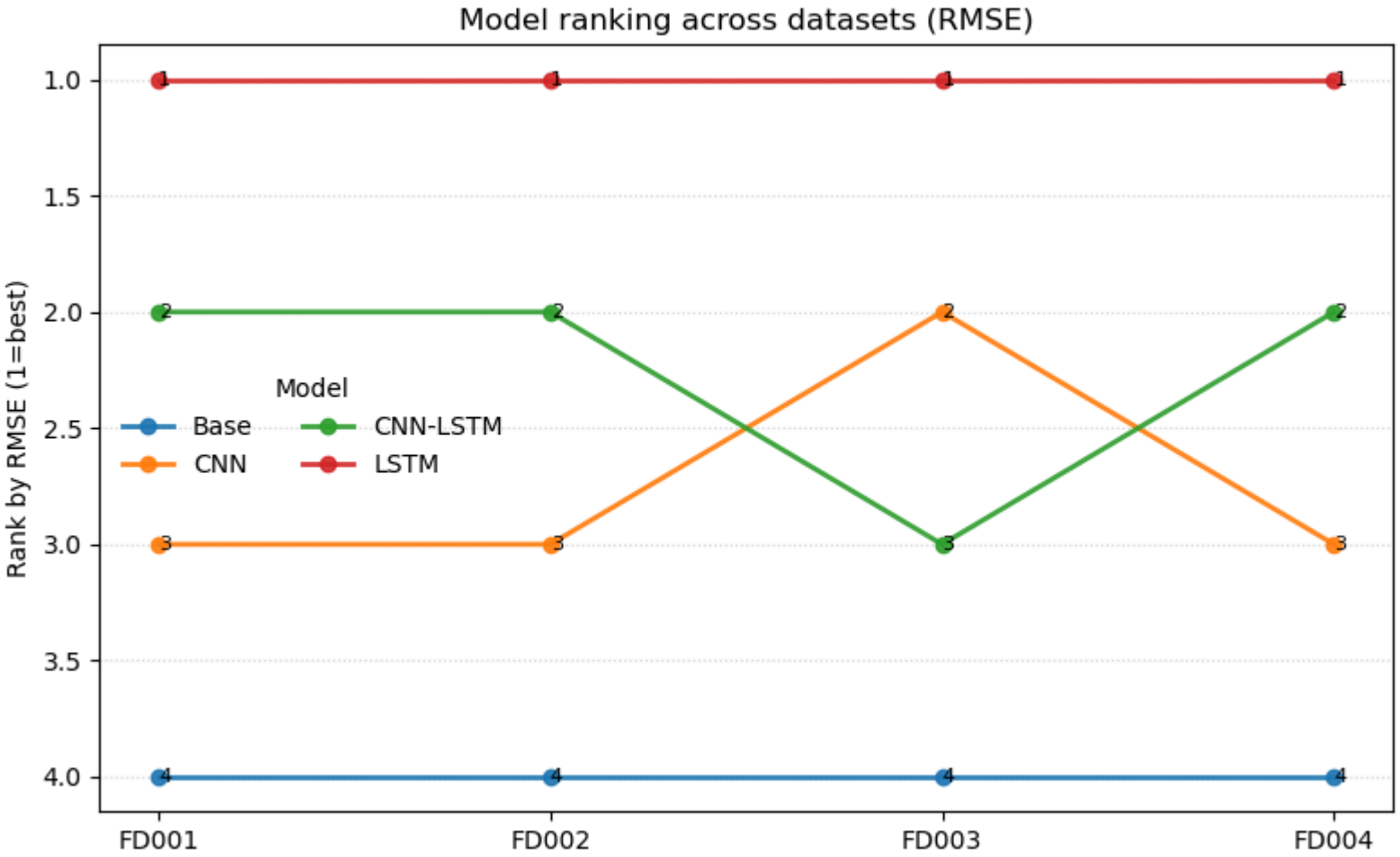
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

def heatmap_metric(df, metric="RMSE", figsize=(7,4), savepath=None):
    pivot = df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
    fig, ax = plt.subplots(figsize=figsize)
    im = ax.imshow(pivot.values, aspect="auto")
    ax.set_xticks(range(pivot.shape[1])); ax.set_xticklabels(pivot.columns)
    ax.set_yticks(range(pivot.shape[0])); ax.set_yticklabels(pivot.index)
    ax.set_title(f"{metric} heatmap (lower is better)")
    ax.set_xlabel("Dataset"); ax.set_ylabel("Model")
    # annotate cells
    for i in range(pivot.shape[0]):
        for j in range(pivot.shape[1]):
            ax.text(j, i, f"{pivot.values[i,j]:.2f}", ha="center", va="center", fontsize=9, color="white")
    fig.colorbar(im, ax=ax, label=metric)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# Use it:
heatmap_metric(presentation_df, "RMSE")
heatmap_metric(presentation_df, "MAE")

```

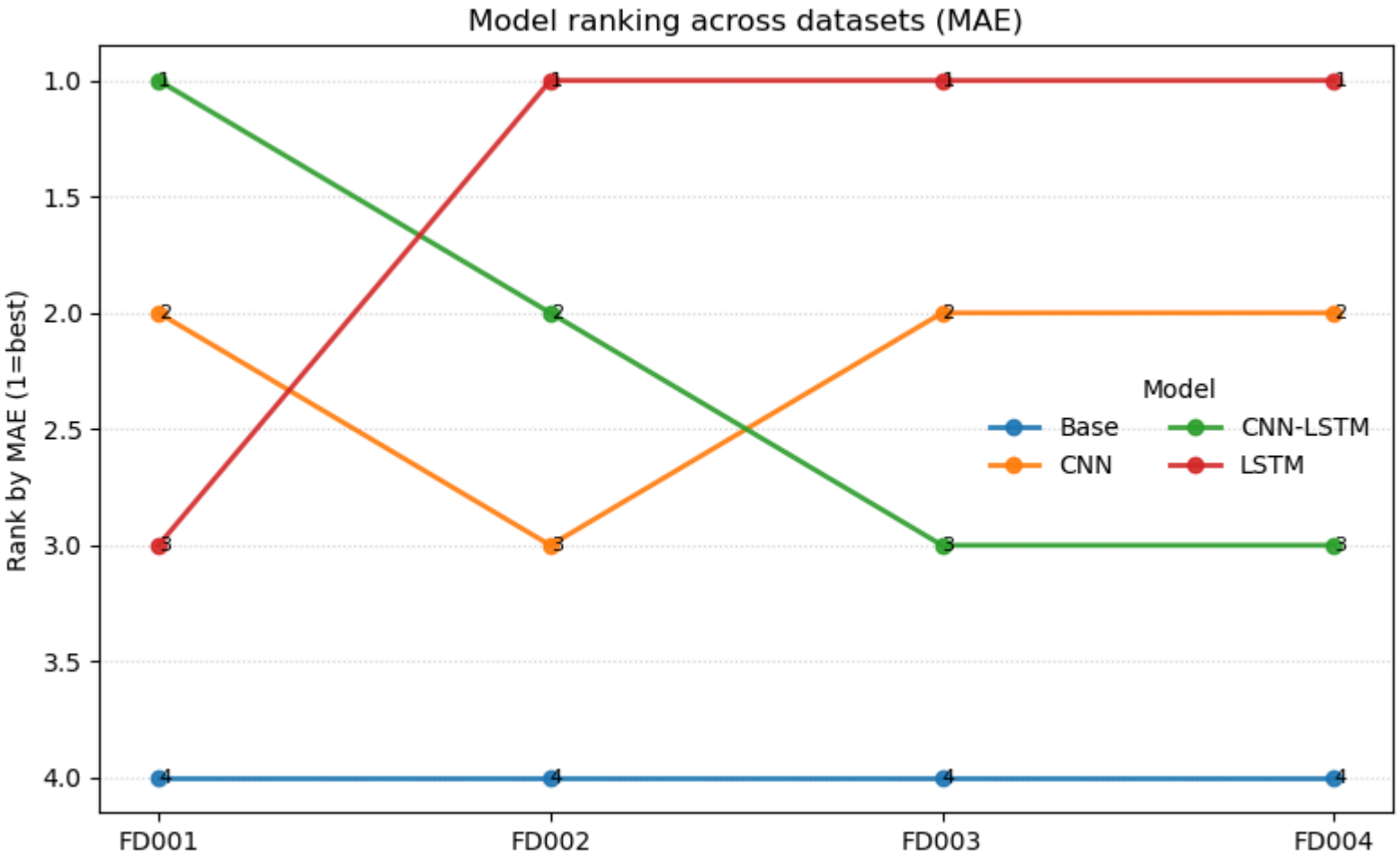

RMSE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
23.28
24.29
20.17
22.19
19.50
24.23
17.45
19.86
19.13
22.68
18.05
19.06
18.61
21.90
14.38
16.25
FD001
FD002
FD003
FD004
Dataset
24
22
20
18
16
RMSE


MAE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
18.82
19.70
15.34
17.53
15.29
19.52
12.62
14.06
15.28
16.87
12.97
15.05
15.79
16.77
9.33
10.66
FD001
FD002
FD003
FD004
Dataset
18
16
14
12
10
MAE

In [5]:

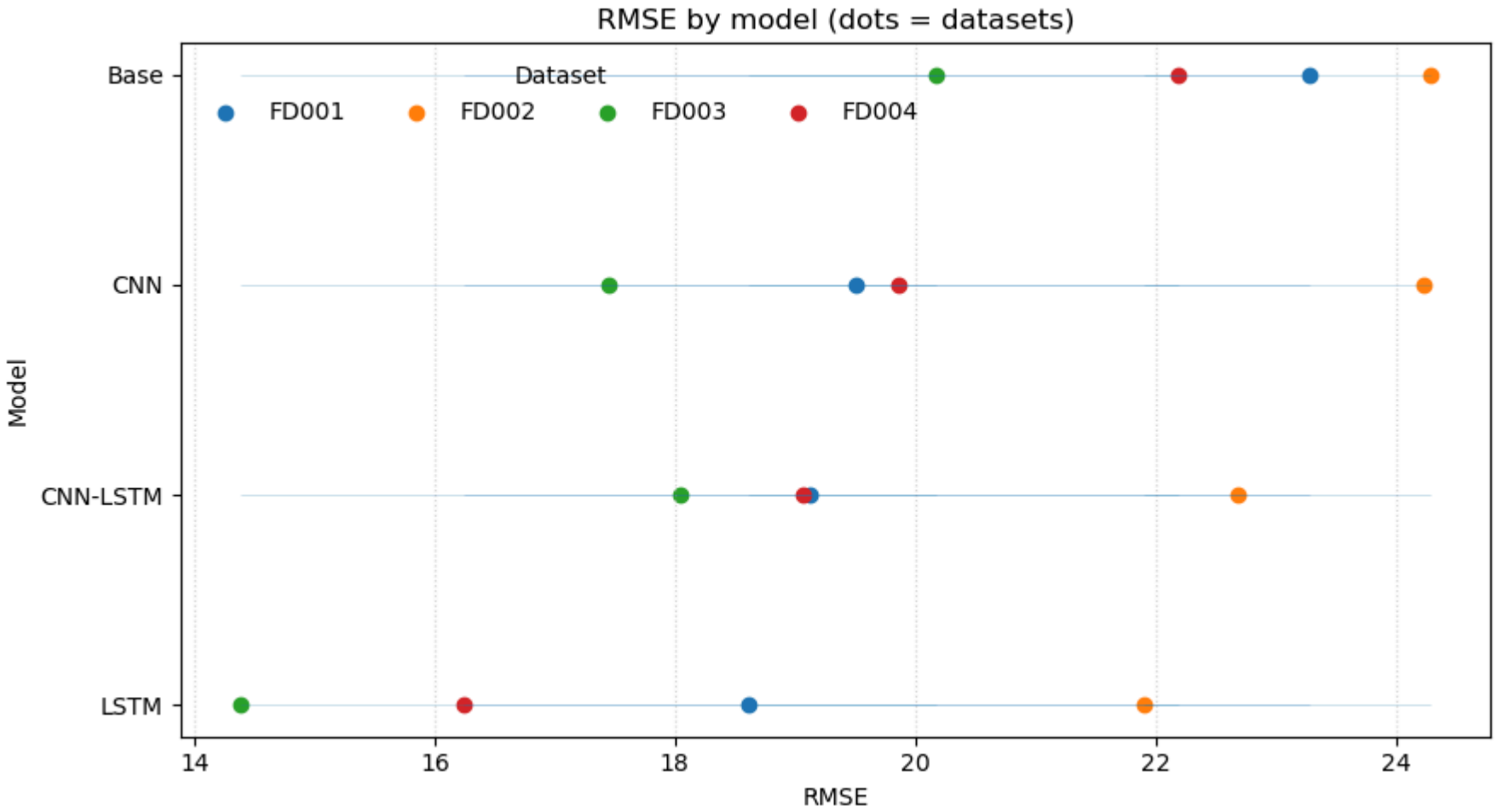
```python
import numpy as np
import matplotlib.pyplot as plt

def slopegraph_ranks(df, metric="RMSE", figsize=(8,5), savepath=None):
    # compute ranks per dataset (1 = best/lowest)
    ranks = (df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
               .rank(axis=0, method="min", ascending=True))
    datasets = ranks.columns.tolist()
    x = np.arange(len(datasets))

    fig, ax = plt.subplots(figsize=figsize)
    for model, row in ranks.iterrows():
        ax.plot(x, row.values, marker="o", linewidth=2, label=model, alpha=0.9)
        for xi, yi in zip(x, row.values):
            ax.text(xi, yi, f"{int(yi)}", va="center", ha="left", fontsize=8)

    ax.set_xticks(x); ax.set_xticklabels(datasets)
    ax.invert_yaxis()  # rank 1 at top
    ax.set_ylabel(f"Rank by {metric} (1=best)")
    ax.set_title(f"Model ranking across datasets ({metric})")
    ax.grid(axis="y", linestyle=":", alpha=0.5)
    ax.legend(title="Model", frameon=False, ncols=2)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# Use it:
slopegraph_ranks(presentation_df, "RMSE")
slopegraph_ranks(presentation_df, "MAE")

```

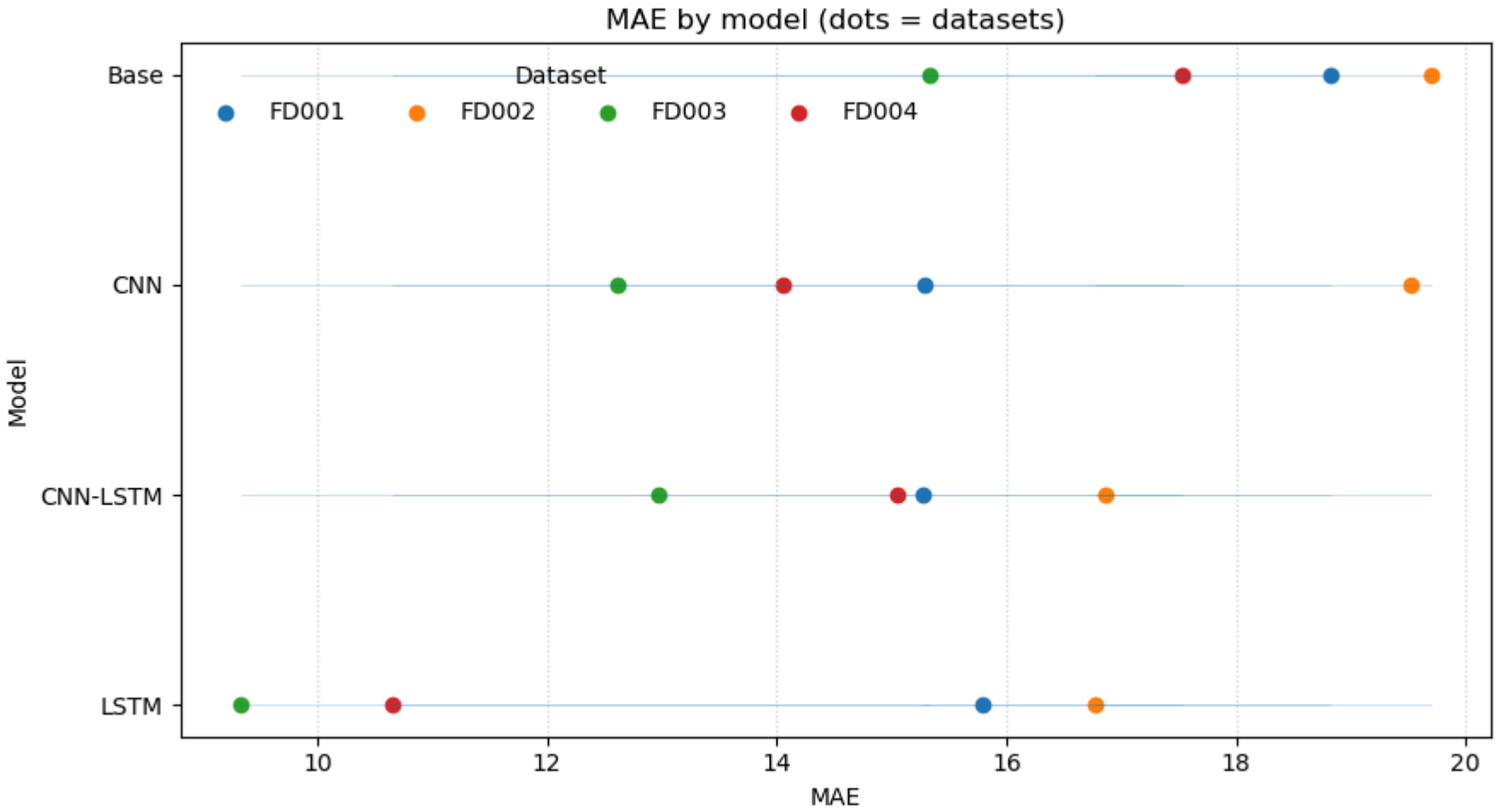

Model ranking across datasets (RMSE)
Rank by RMSE (1=best)
1.0
1.5
2.0
2.5
3.0
3.5
4.0
FD001
FD002
FD003
FD004
Model
Base
CNN
CNN-LSTM
LSTM


Model ranking across datasets (MAE)
Rank by MAE (1=best)
1.0
1.5
2.0
2.5
3.0
3.5
4.0
FD001
FD002
FD003
FD004
Model
Base
CNN
CNN-LSTM
LSTM

In [6]:

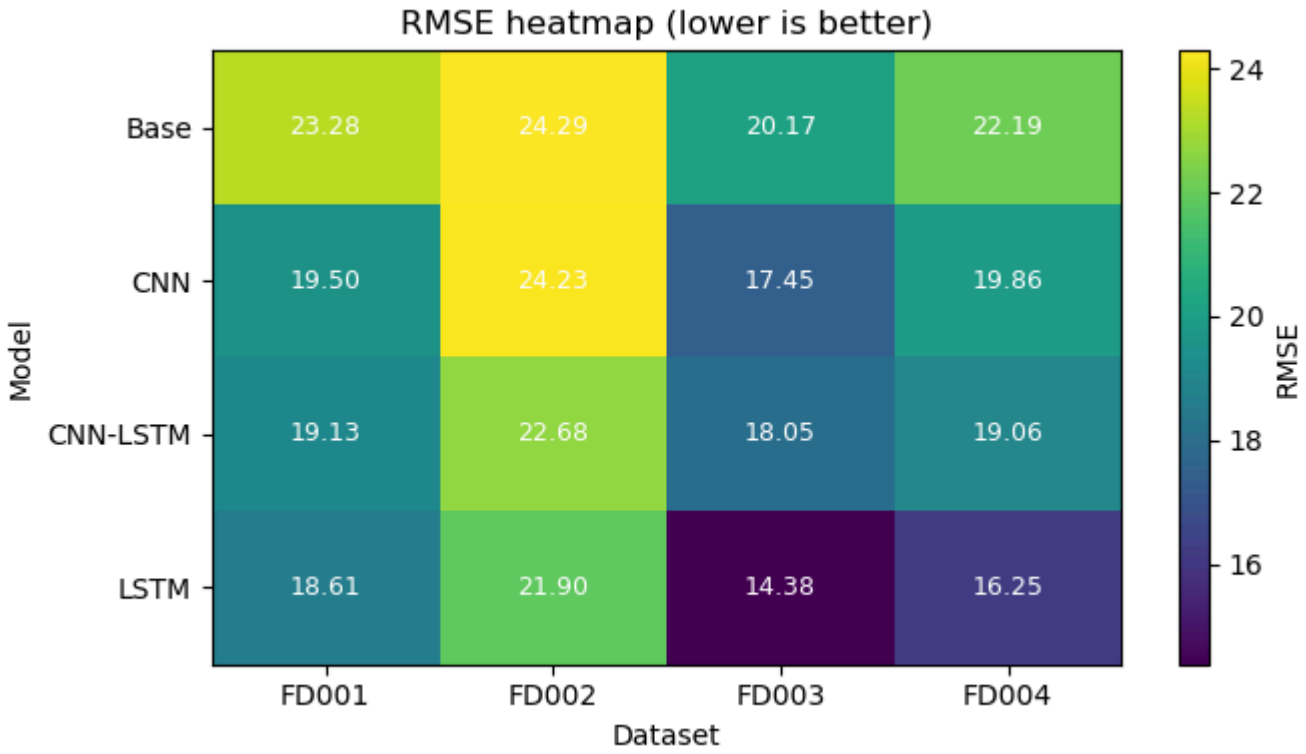
```python
import matplotlib.pyplot as plt

def cleveland_dotplot(df, metric="RMSE", figsize=(9,5), savepath=None):
    work = df[["Dataset","model",metric]].copy()
    # order models by overall mean
    model_order = (work.groupby("model")[metric].mean()
                   .sort_values(ascending=True).index.tolist())
    datasets = sorted(work["Dataset"].unique())

    fig, ax = plt.subplots(figsize=figsize)
    y_positions = np.arange(len(model_order))
    for ds in datasets:
        vals = (work[work["Dataset"]==ds]
                  .set_index("model")
                  .reindex(model_order)[metric])
        ax.scatter(vals.values, y_positions, label=ds)
        # light stems for readability
        ax.hlines(y=y_positions, xmin=vals.min(), xmax=vals.max(), linewidth=0.5, alpha=0.3)

    ax.set_yticks(y_positions); ax.set_yticklabels(model_order)
    ax.set_xlabel(metric); ax.set_ylabel("Model")
    ax.set_title(f"{metric} by model (dots = datasets)")
    ax.grid(axis="x", linestyle=":", alpha=0.5)
    ax.legend(title="Dataset", frameon=False, ncols=min(4, len(datasets)))
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# Use it:
cleveland_dotplot(presentation_df, "RMSE")
cleveland_dotplot(presentation_df, "MAE")

```

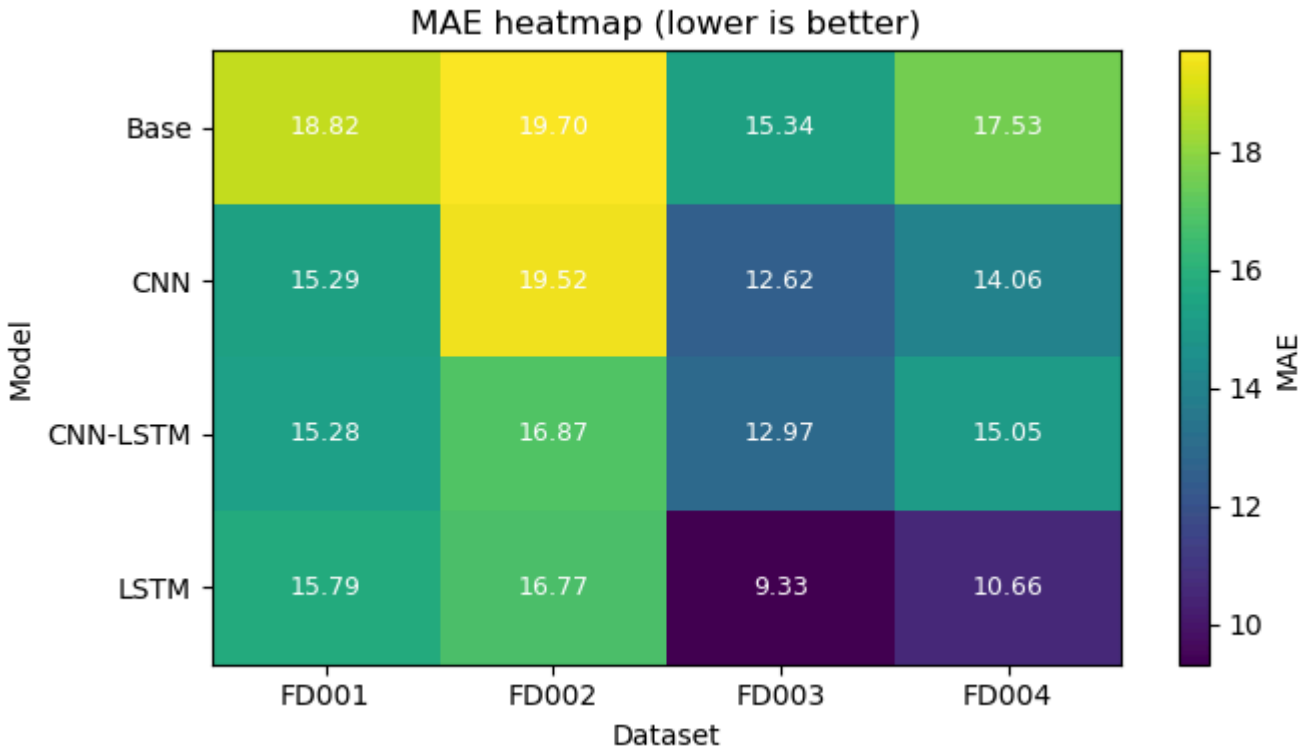

RMSE by model (dots = datasets)
Dataset
FD001
FD002
FD003
FD004
Base
CNN
CNN-LSTM
LSTM
Model
14
16
18
20
22
24
RMSE


MAE by model (dots = datasets)
Base
CNN
CNN-LSTM
LSTM
Model
Dataset
FD001
FD002
FD003
FD004
10
12
14
16
18
20
MAE

In [10]:

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

def heatmap_metric(df, metric="RMSE", figsize=(7,4), savepath=None):
    pivot = df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
    fig, ax = plt.subplots(figsize=figsize)
    im = ax.imshow(pivot.values, aspect="auto")
    ax.set_xticks(range(pivot.shape[1])); ax.set_xticklabels(pivot.columns)
    ax.set_yticks(range(pivot.shape[0])); ax.set_yticklabels(pivot.index)
    ax.set_title(f"{metric} heatmap (lower is better)")
    ax.set_xlabel("Dataset"); ax.set_ylabel("Model")
    # annotate cells
    for i in range(pivot.shape[0]):
        for j in range(pivot.shape[1]):
            ax.text(j, i, f"{pivot.values[i,j]:.2f}", ha="center", va="center", fontsize=9, color="white")
    fig.colorbar(im, ax=ax, label=metric)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# Use it:
heatmap_metric(presentation_df, "RMSE")
heatmap_metric(presentation_df, "MAE")

```


RMSE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
23.28
24.29
20.17
22.19
19.50
24.23
17.45
19.86
19.13
22.68
18.05
19.06
18.61
21.90
14.38
16.25
FD001
FD002
FD003
FD004
Dataset
24
22
20
18
16
RMSE


MAE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
18.82
19.70
15.34
17.53
15.29
19.52
12.62
14.06
15.28
16.87
12.97
15.05
15.79
16.77
9.33
10.66
FD001
FD002
FD003
FD004
Dataset
18
16
14
12
10
MAE

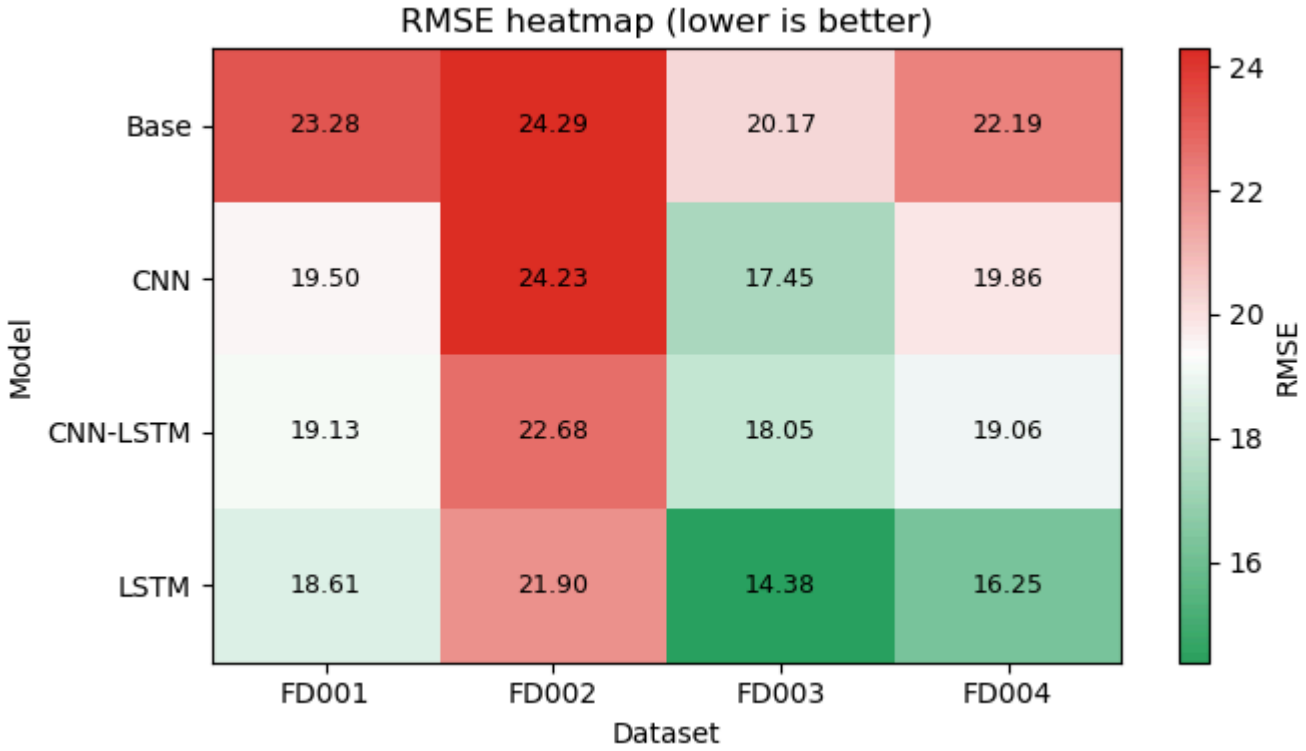
In [17]:

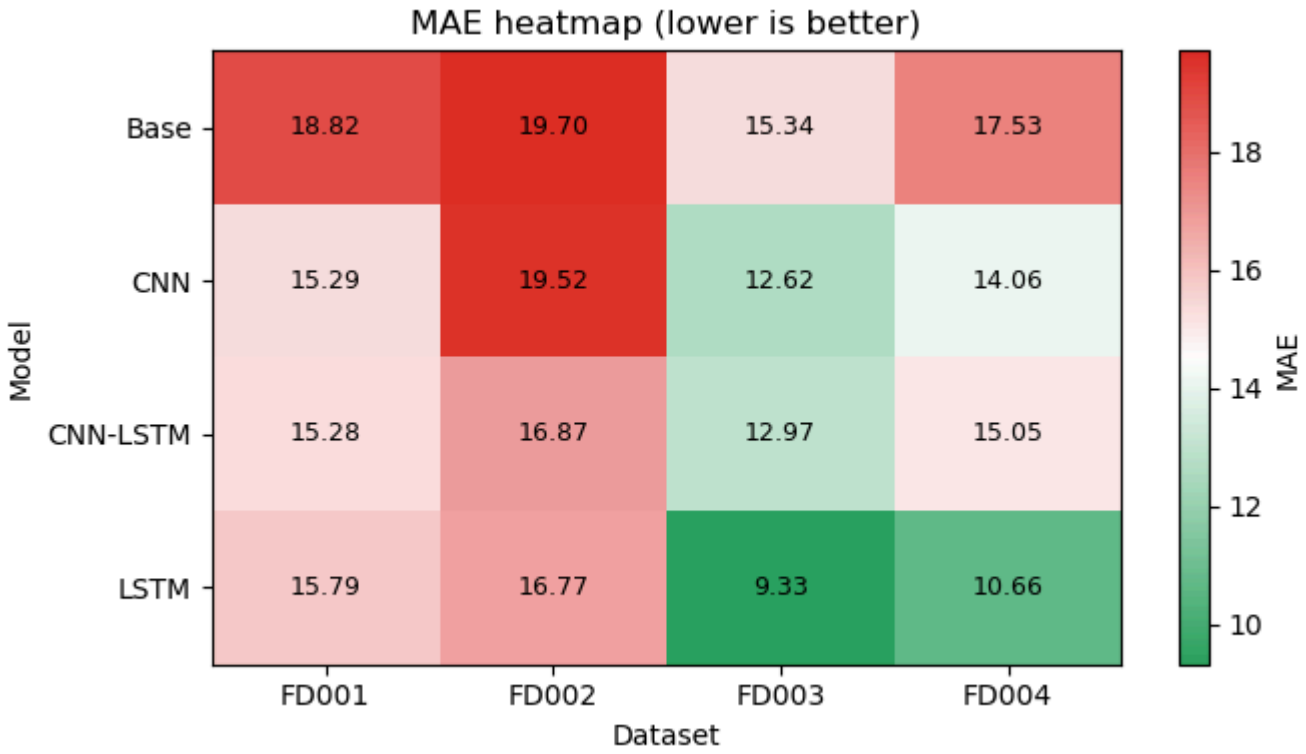
```python
import matplotlib.pyplot as plt
from matplotlib.colors import LinearSegmentedColormap

# 1) Green → White → Red  (traffic-light with white mid)
def heatmap_metric_gwr(df, metric="RMSE", figsize=(7,4), savepath=None):
    pivot = df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
    cmap = LinearSegmentedColormap.from_list("gwr", ["#2ca25f", "#ffffff", "#de2d26"])
    fig, ax = plt.subplots(figsize=figsize)
    im = ax.imshow(pivot.values, aspect="auto", cmap=cmap)
    ax.set_xticks(range(pivot.shape[1])); ax.set_xticklabels(pivot.columns)
    ax.set_yticks(range(pivot.shape[0])); ax.set_yticklabels(pivot.index)
    ax.set_title(f"{metric} heatmap (lower is better)")
    ax.set_xlabel("Dataset"); ax.set_ylabel("Model")
    for i in range(pivot.shape[0]):
        for j in range(pivot.shape[1]):
            ax.text(j, i, f"{pivot.values[i,j]:.2f}", ha="center", va="center", fontsize=9, color="black")
    fig.colorbar(im, ax=ax, label=metric)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# 2) Green → Yellow → Red (built-in, reversed so green=low, red=high)
def heatmap_metric_rdylgn(df, metric="RMSE", figsize=(7,4), savepath=None):
    pivot = df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
    fig, ax = plt.subplots(figsize=figsize)
    im = ax.imshow(pivot.values, aspect="auto", cmap="RdYlGn_r")
    ax.set_xticks(range(pivot.shape[1])); ax.set_xticklabels(pivot.columns)
    ax.set_yticks(range(pivot.shape[0])); ax.set_yticklabels(pivot.index)
    ax.set_title(f"{metric} heatmap (lower is better)")
    ax.set_xlabel("Dataset"); ax.set_ylabel("Model")
    for i in range(pivot.shape[0]):
        for j in range(pivot.shape[1]):
            ax.text(j, i, f"{pivot.values[i,j]:.2f}", ha="center", va="center", fontsize=9, color="black")
    fig.colorbar(im, ax=ax, label=metric)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# 3) Green → Light Grey → Red (softer mid-tone)
def heatmap_metric_glgr(df, metric="RMSE", figsize=(7,4), savepath=None):
    pivot = df.pivot_table(index="model", columns="Dataset", values=metric, aggfunc="mean")
```

```
    cmap = LinearSegmentedColormap.from_list("glgr", ["#1b9e77", "#f0f0f0", "#d73027"])
    fig, ax = plt.subplots(figsize=figsize)
    im = ax.imshow(pivot.values, aspect="auto", cmap=cmap)
    ax.set_xticks(range(pivot.shape[1])); ax.set_xticklabels(pivot.columns)
    ax.set_yticks(range(pivot.shape[0])); ax.set_yticklabels(pivot.index)
    ax.set_title(f"{metric} heatmap (lower is better)")
    ax.set_xlabel("Dataset"); ax.set_ylabel("Model")
    for i in range(pivot.shape[0]):
        for j in range(pivot.shape[1]):
            ax.text(j, i, f"{pivot.values[i,j]:.2f}", ha="center", va="center", fontsize=9, color="black")
    fig.colorbar(im, ax=ax, label=metric)
    fig.tight_layout()
    if savepath: fig.savefig(savepath, dpi=300, bbox_inches="tight")
    plt.show()

# --- Usage examples ---

```

In [18]:

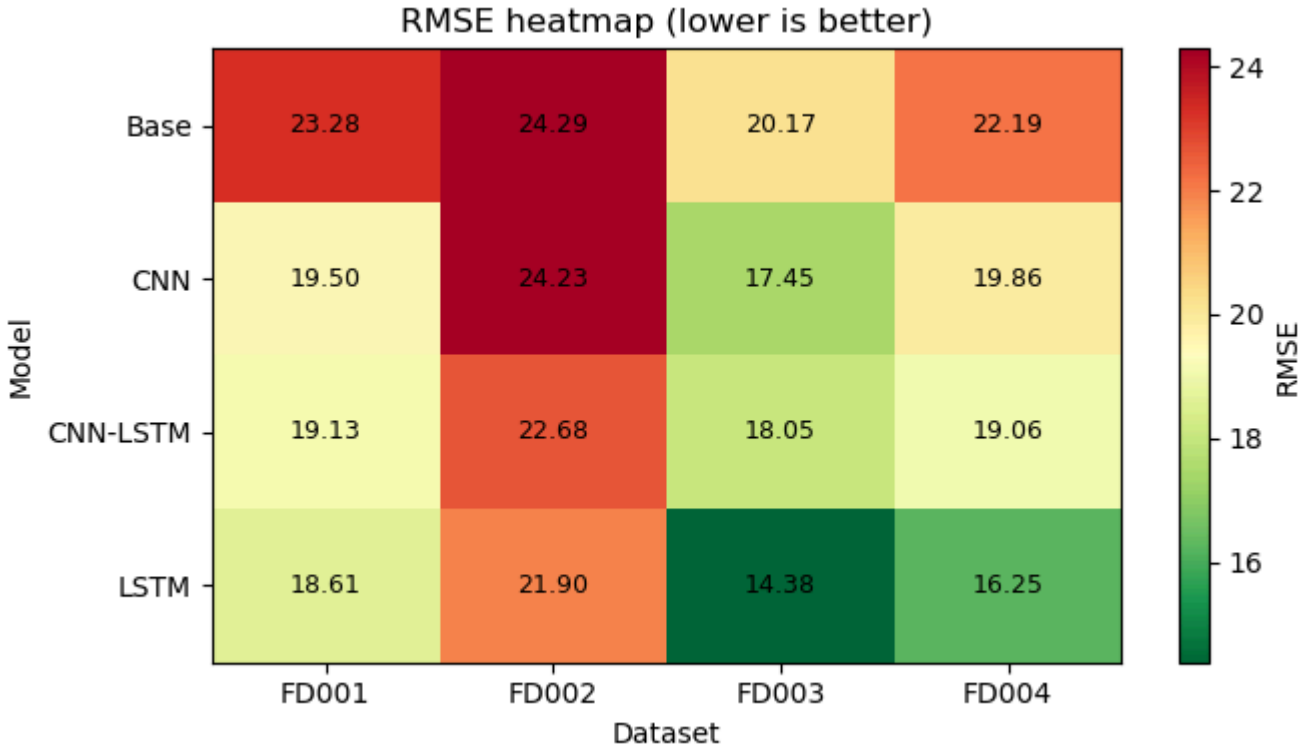
```
heatmap_metric_gwr(presentation_df, "RMSE")
heatmap_metric_gwr(presentation_df, "MAE")
```

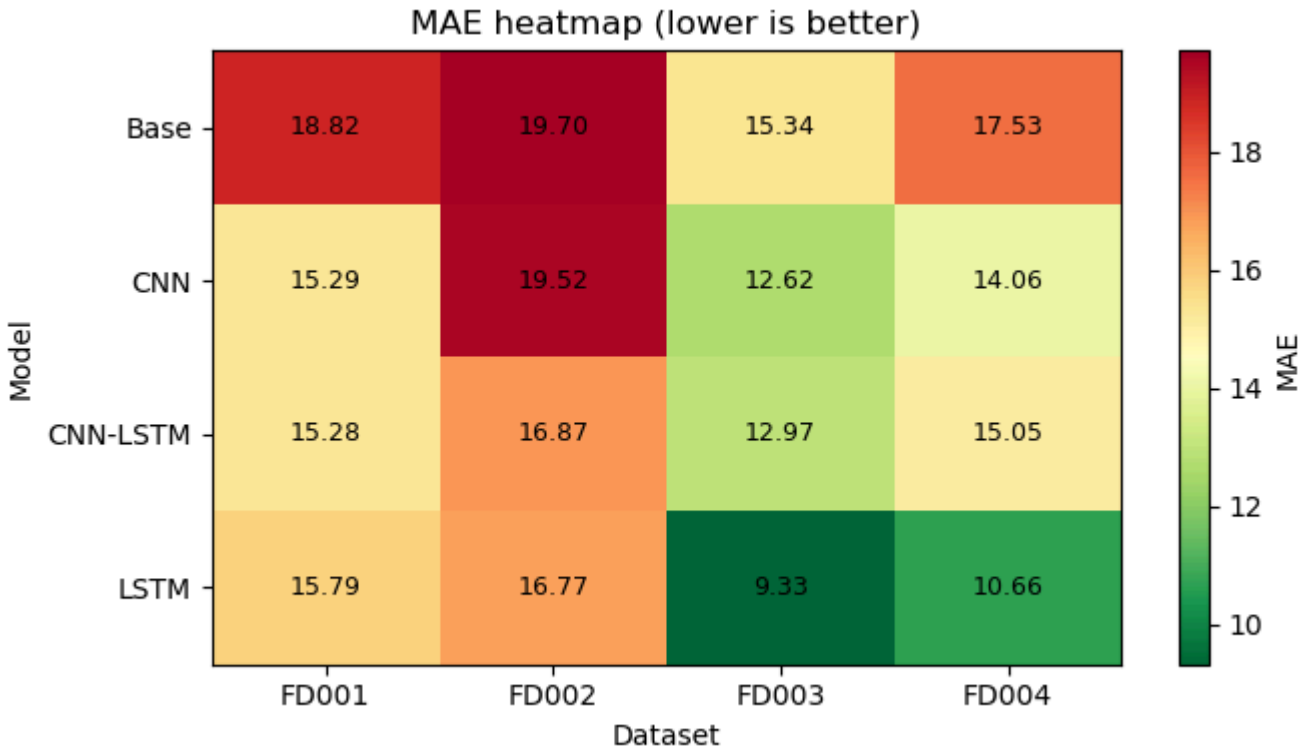



MAE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
18.82
19.70
15.34
17.53
15.29
19.52
12.62
14.06
15.28
16.87
12.97
15.05
15.79
16.77
9.33
10.66
FD001
FD002
FD003
FD004
Dataset
18
16
14
12
10
MAE

In [19]:

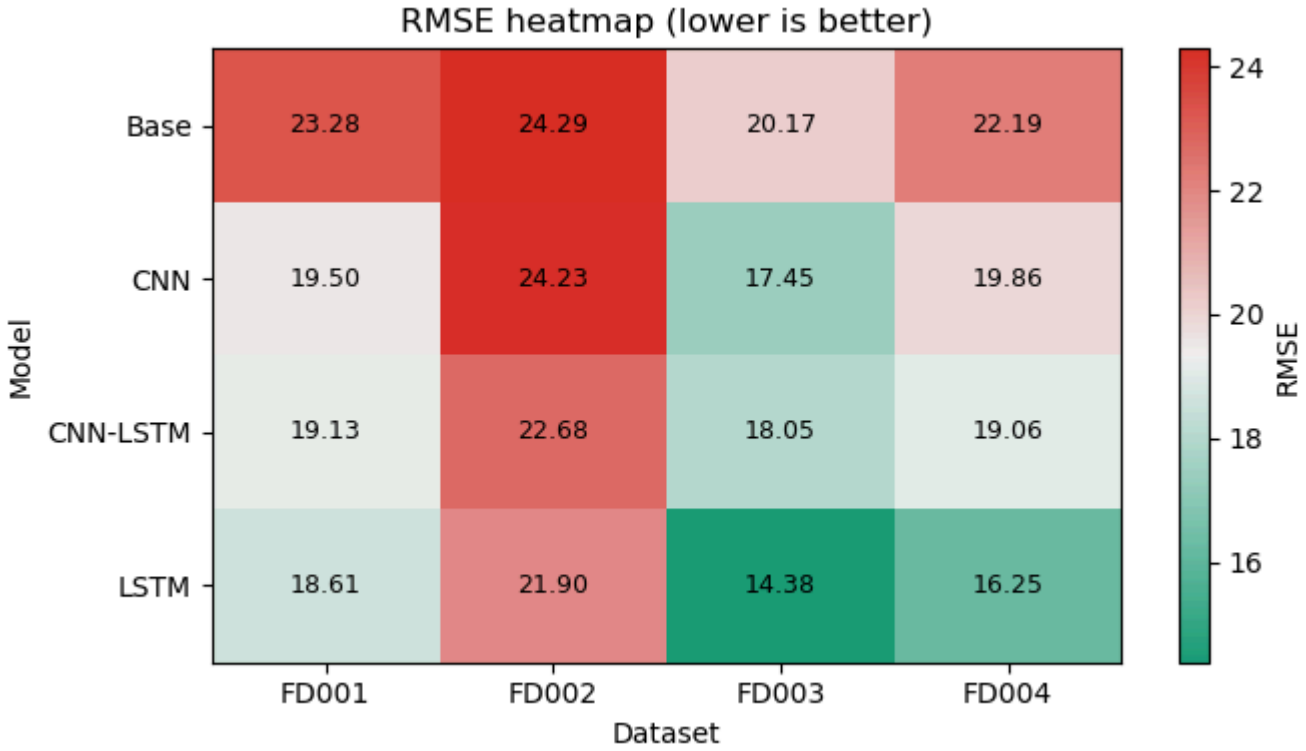
```
heatmap_metric_rdylgn(presentation_df, "RMSE")
heatmap_metric_rdylgn(presentation_df, "MAE")
```

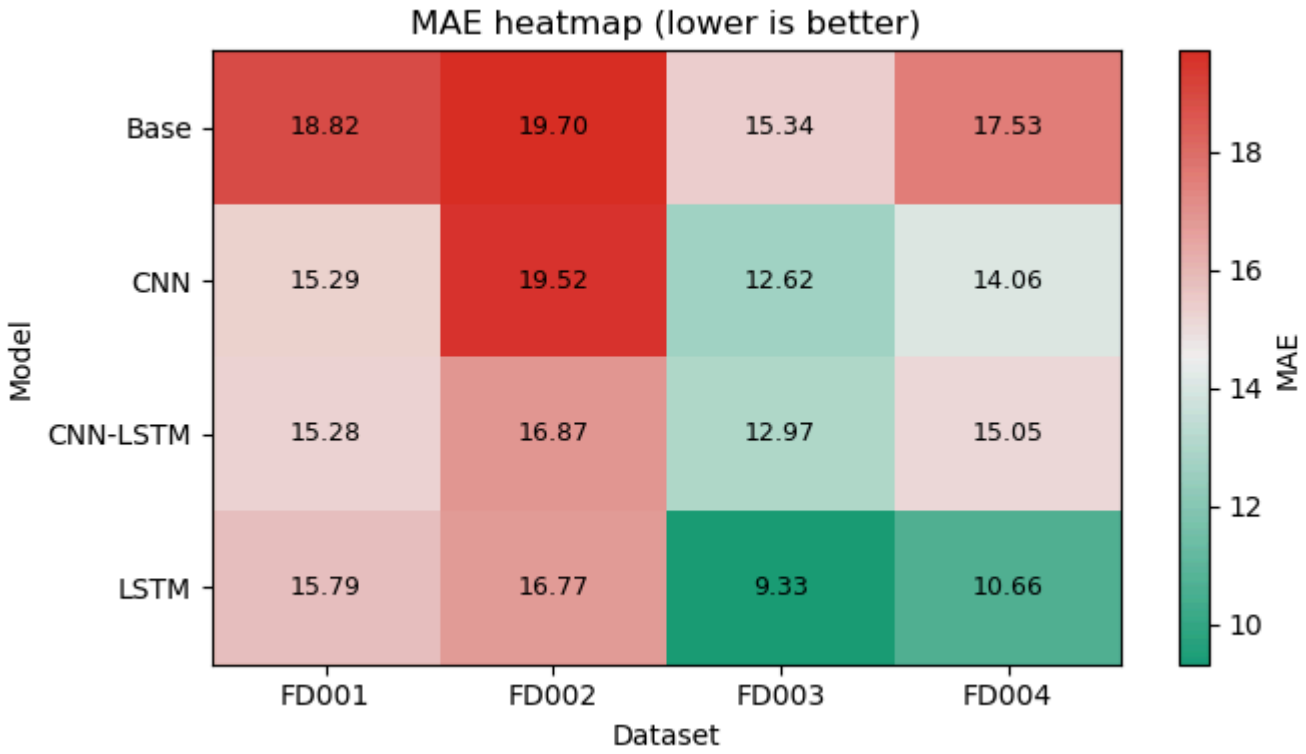



MAE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
18.82
19.70
15.34
17.53
15.29
19.52
12.62
14.06
15.28
16.87
12.97
15.05
15.79
16.77
9.33
10.66
FD001
FD002
FD003
FD004
Dataset
MAE
18
16
14
12
10

In [20]:

```
heatmap_metric_glgr(presentation_df, "RMSE")
heatmap_metric_glgr(presentation_df, "MAE")
```



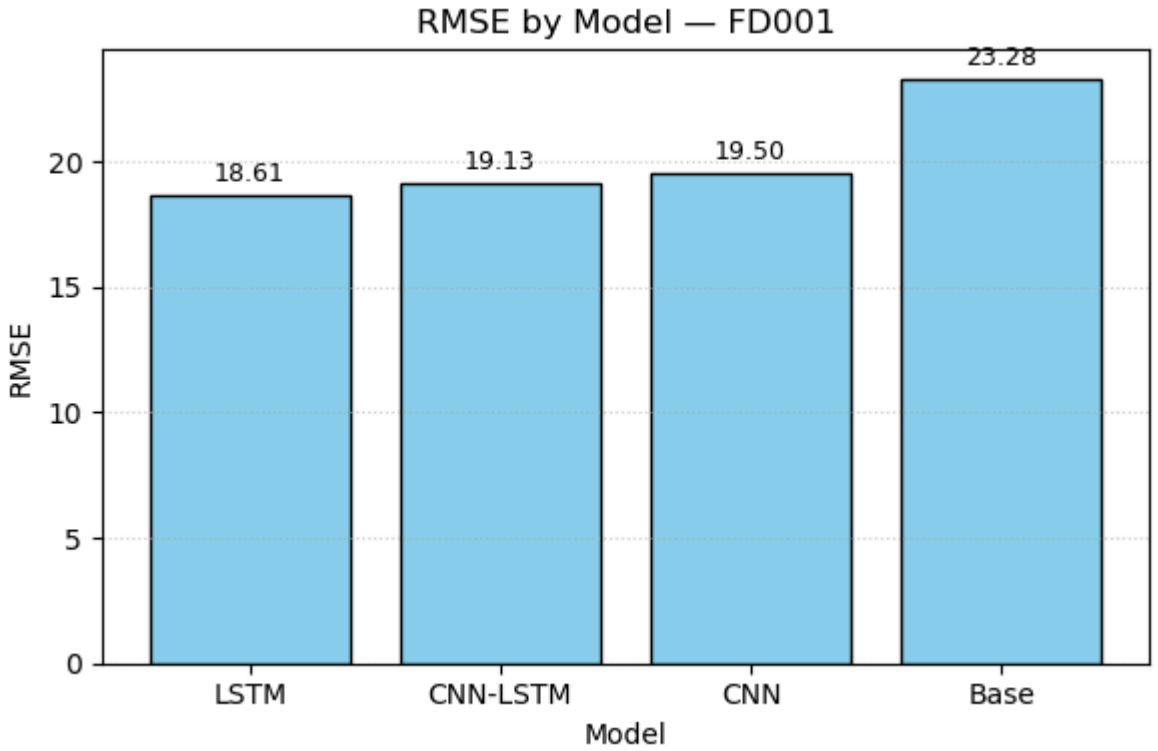

MAE heatmap (lower is better)
Base
CNN
CNN-LSTM
LSTM
Model
18.82
19.70
15.34
17.53
15.29
19.52
12.62
14.06
15.28
16.87
12.97
15.05
15.79
16.77
9.33
10.66
FD001
FD002
FD003
FD004
Dataset
18
16
14
12
10
MAE

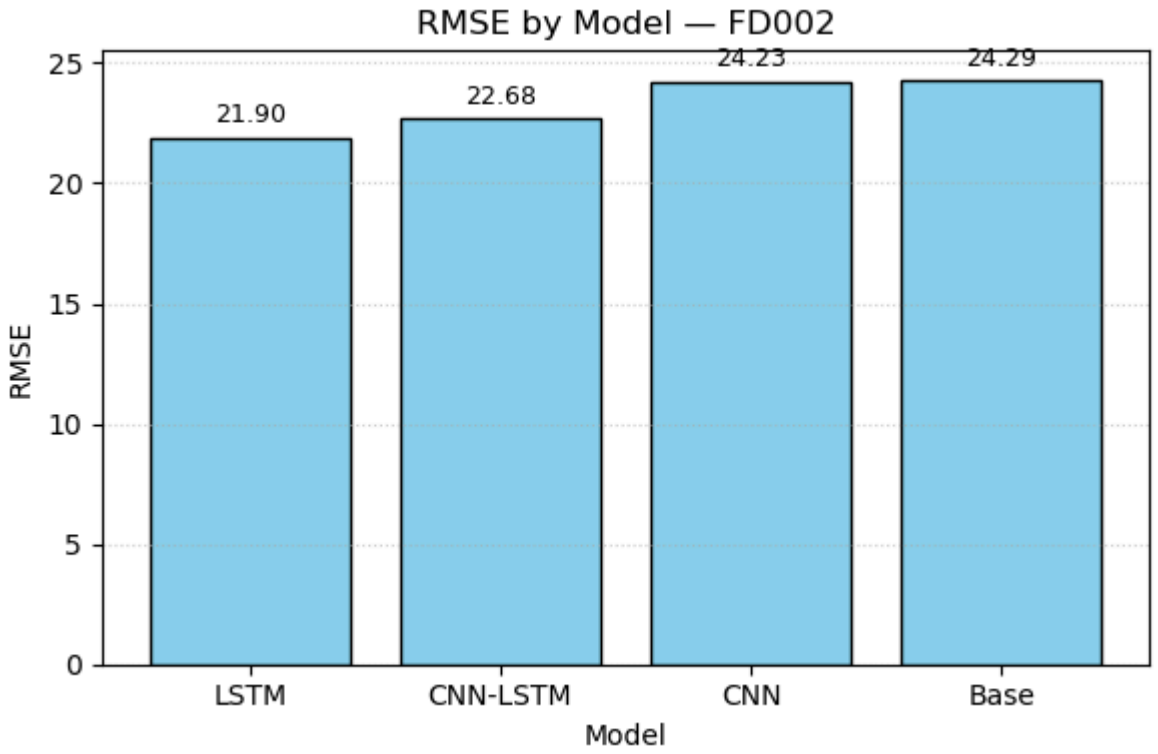
In [23]:

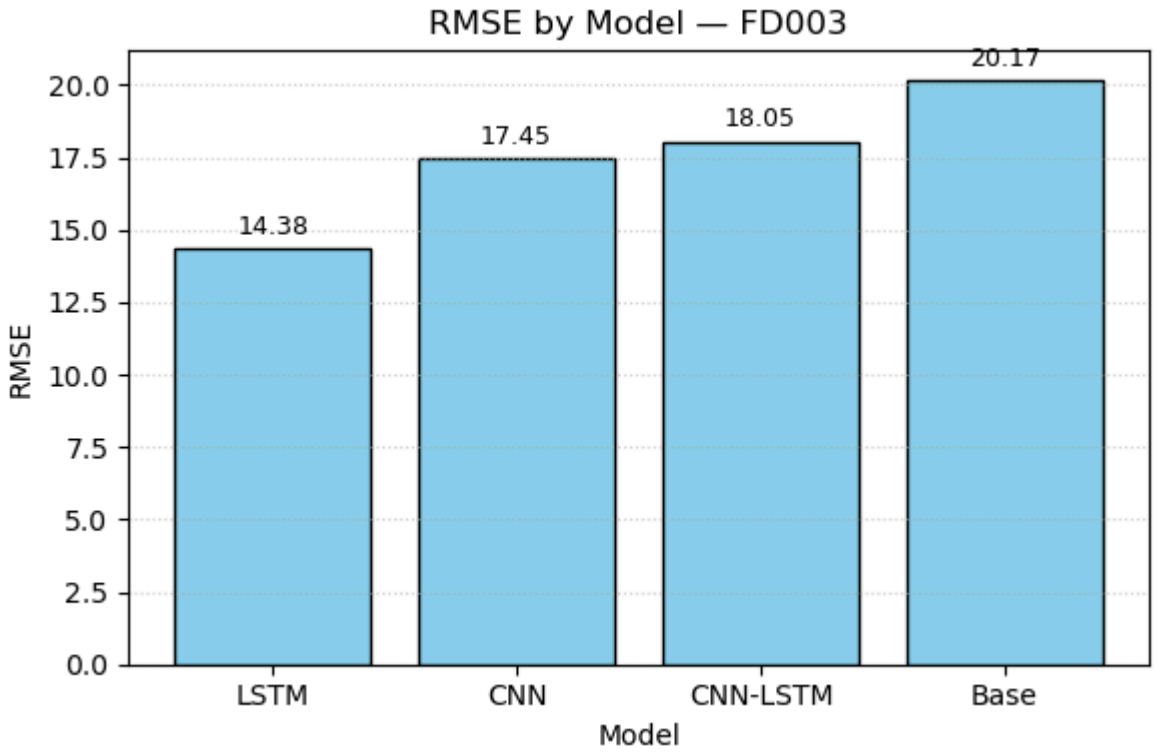
```python
import matplotlib.pyplot as plt

def plot_per_dataset_bars(df, metric="RMSE", figsize=(6,4), savepath=None):
    """
    Bar plots per dataset for a single metric, ordered lowest → highest.

    df: DataFrame with ['Dataset','model','RMSE','MAE']
    metric: 'RMSE' or 'MAE'
    """
    datasets = sorted(df["Dataset"].unique())

    for ds in datasets:
        subset = df[df["Dataset"]==ds].copy()
        subset = subset.sort_values(by=metric, ascending=True)

        fig, ax = plt.subplots(figsize=figsize)
        bars = ax.bar(subset["model"], subset[metric], color="skyblue", edgecolor="black")

        # annotate values
        for bar in bars:
            h = bar.get_height()
            ax.annotate(f"{h:.2f}",
                        xy=(bar.get_x() + bar.get_width()/2, h),
                        xytext=(0, 3), textcoords="offset points",
                        ha="center", va="bottom", fontsize=9)

        ax.set_title(f"{metric} by Model — {ds}")
        ax.set_ylabel(metric)
        ax.set_xlabel("Model")
        ax.grid(axis="y", linestyle=":", alpha=0.6)
        plt.tight_layout()

        if savepath:
            fig.savefig(f"{savepath}_{ds}_{metric}.png", dpi=300, bbox_inches="tight")
        plt.show()

# Example usage:
```

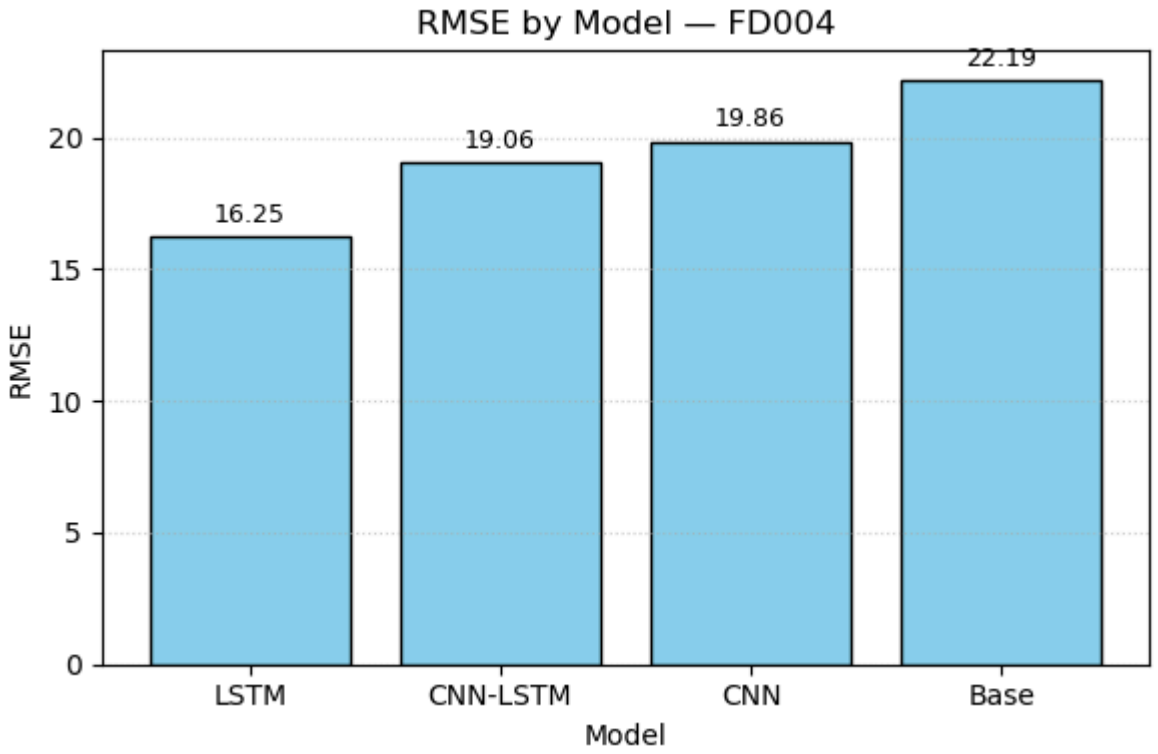
In [24]:

```
1 plot_per_dataset_bars(presentation_df, "RMSE")
```



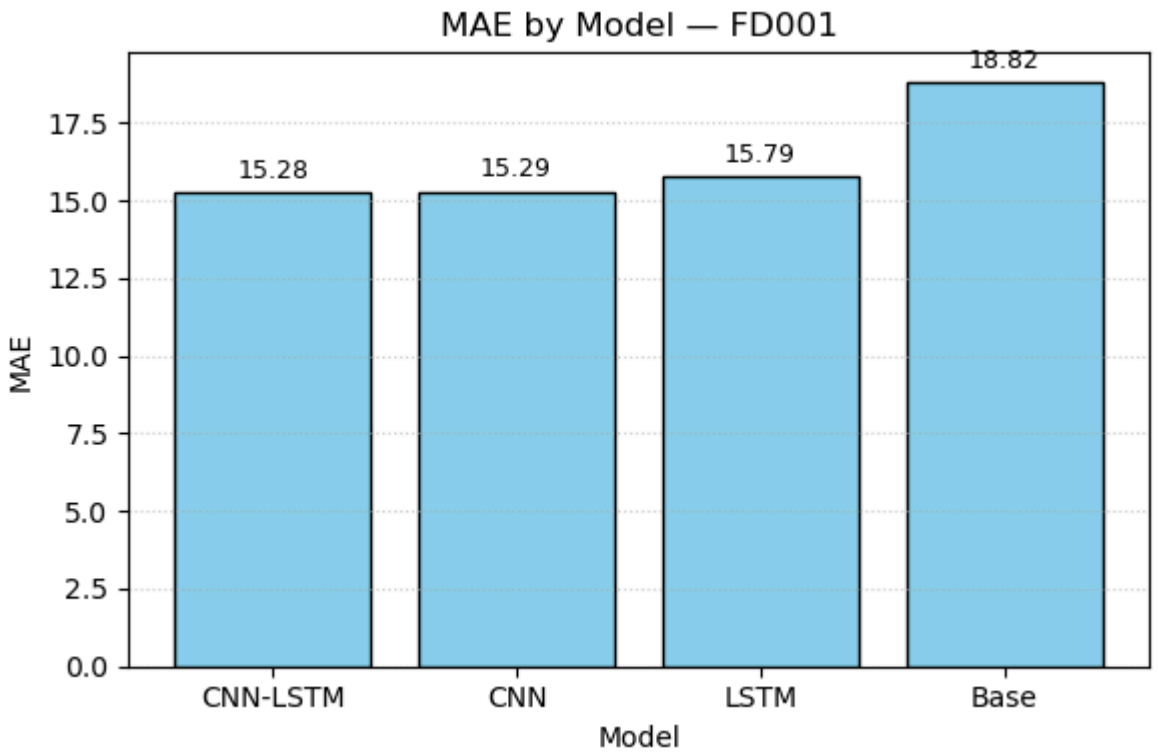

RMSE by Model — FD002
RMSE
Model
0
5
10
15
20
25
21.90
22.68
24.23
24.29
LSTM
CNN-LSTM
CNN
Base

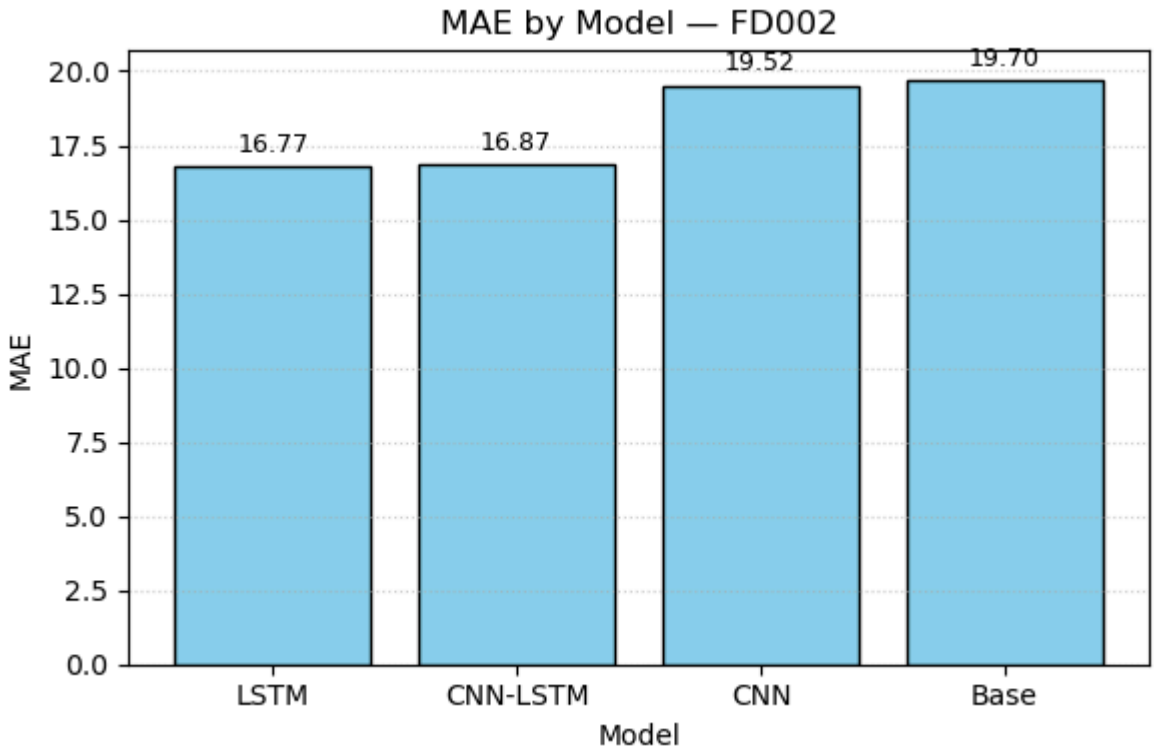

RMSE by Model — FD003
RMSE
Model
LSTM
CNN
CNN-LSTM
Base
14.38
17.45
18.05
20.17
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

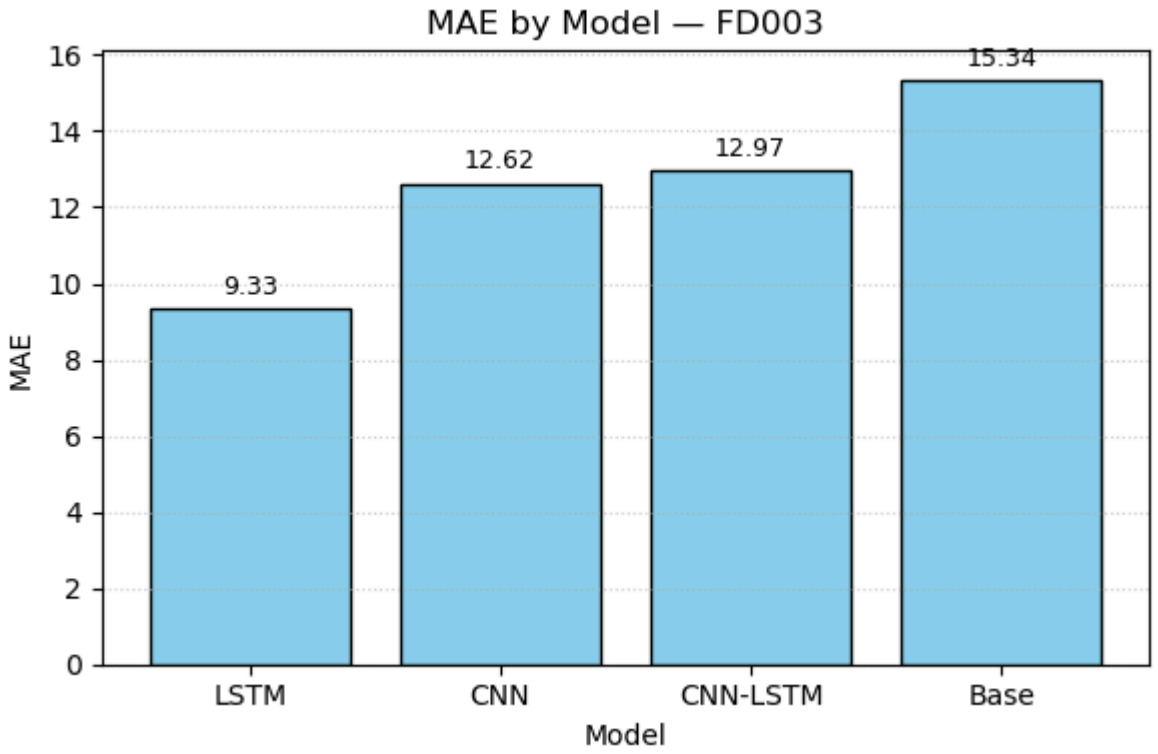

RMSE by Model — FD004
RMSE
0
5
10
15
20
16.25
19.06
19.86
22.19
LSTM
CNN-LSTM
CNN
Base
Model

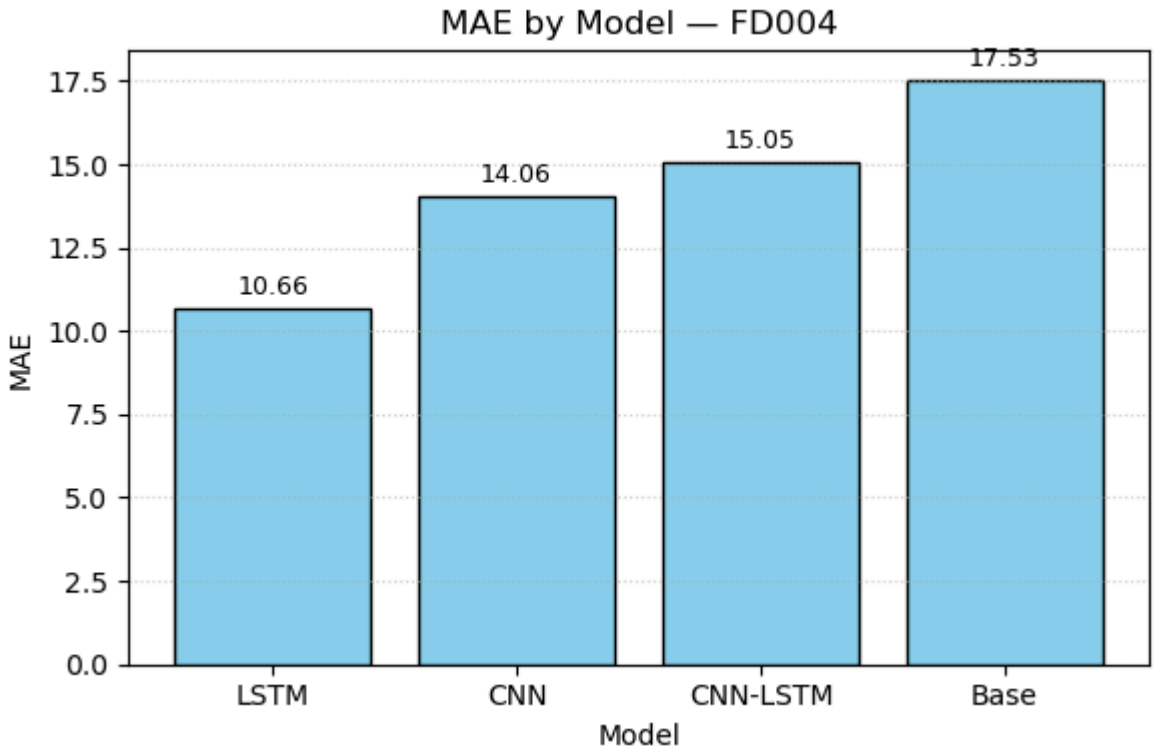
In [25]:

```
1 plot_per_dataset_bars(presentation_df, "MAE")
```




MAE by Model — FD002
MAE
Model
LSTM
CNN-LSTM
CNN
Base
16.77
16.87
19.52
19.70
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


MAE by Model — FD003
MAE
Model
LSTM
CNN
CNN-LSTM
Base
9.33
12.62
12.97
15.34
0
2
4
6
8
10
12
14
16


MAE by Model — FD004
MAE
Model
LSTM
CNN
CNN-LSTM
Base
10.66
14.06
15.05
17.53
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5

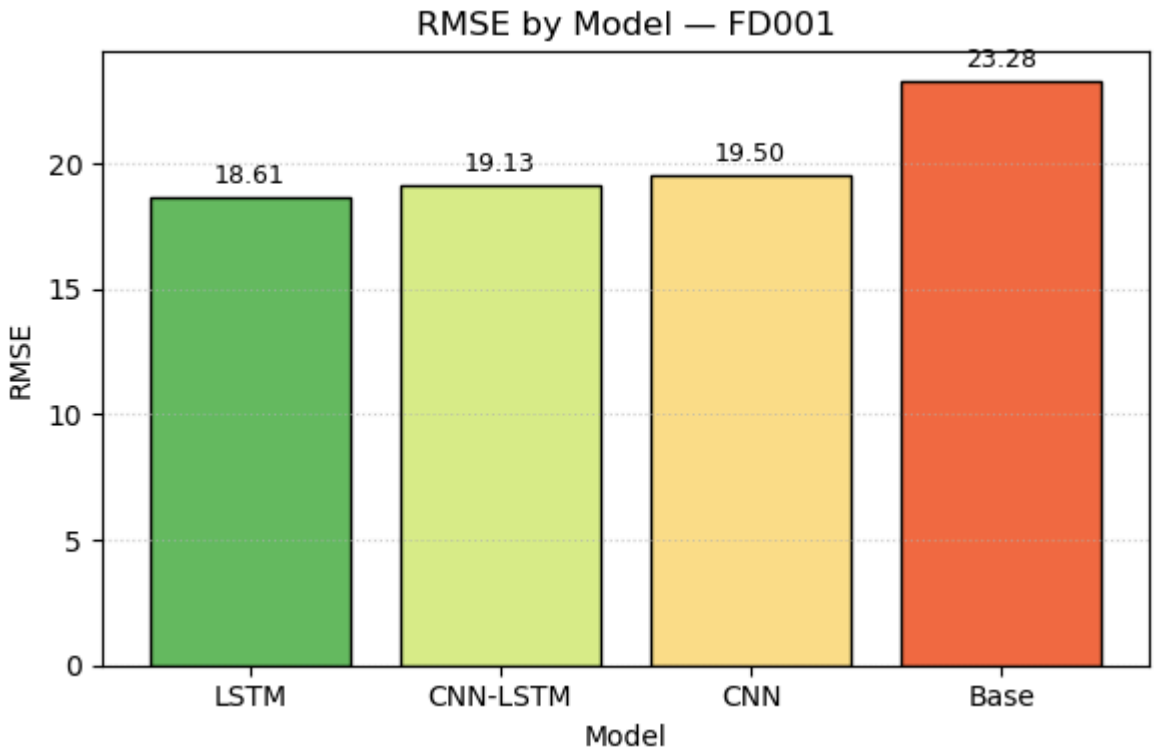
In [26]:

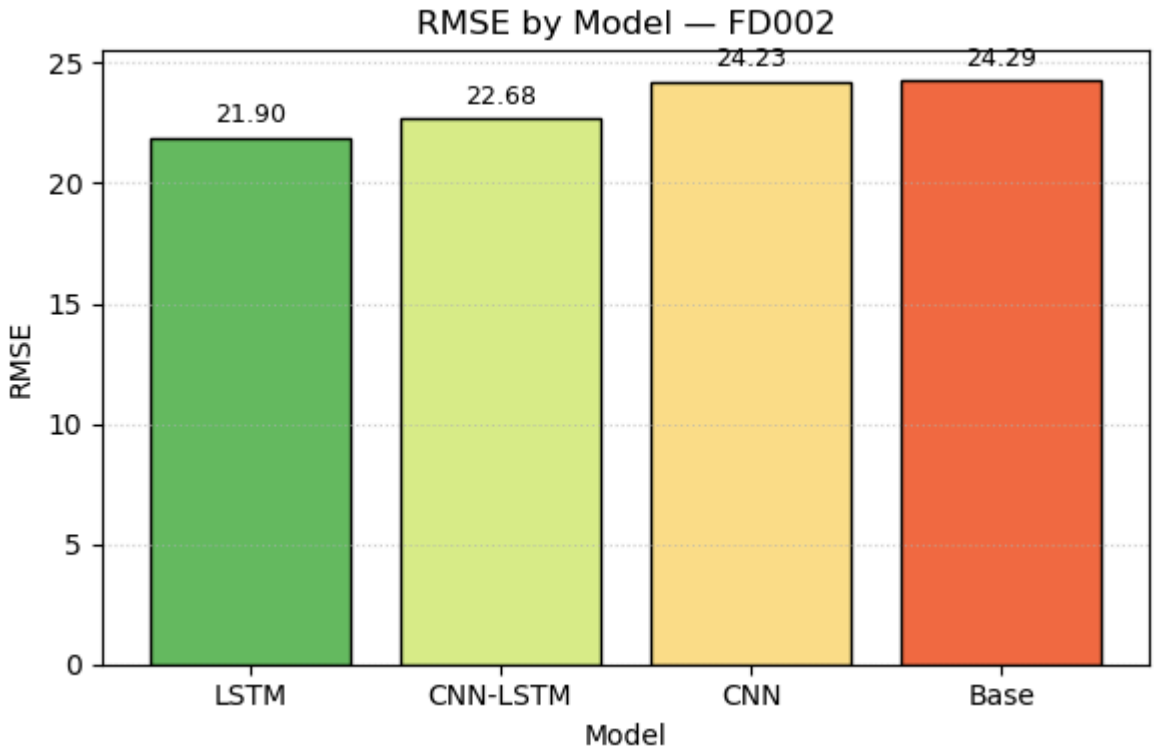
```python
import matplotlib.pyplot as plt
import seaborn as sns

def plot_per_dataset_bars(df, metric="RMSE", figsize=(6,4), palette="skyblue", savepath=None):
    """
    Bar plots per dataset for a single metric, ordered lowest → highest.

    df: DataFrame with ['Dataset','model','RMSE','MAE']
    metric: 'RMSE' or 'MAE'
    palette: colour or seaborn palette name
    """
    datasets = sorted(df["Dataset"].unique())

    for ds in datasets:
        subset = df[df["Dataset"]==ds].copy()
        subset = subset.sort_values(by=metric, ascending=True)

        fig, ax = plt.subplots(figsize=figsize)

        # get colours
        if isinstance(palette, str):
            colors = sns.color_palette(palette, n_colors=len(subset))
        else:
            colors = palette

        bars = ax.bar(subset["model"], subset[metric],
                      color=colors, edgecolor="black")

        # annotate values
        for bar in bars:
            h = bar.get_height()
            ax.annotate(f"{h:.2f}",
                        xy=(bar.get_x() + bar.get_width()/2, h),
                        xytext=(0, 3), textcoords="offset points",
                        ha="center", va="bottom", fontsize=9)

        ax.set_title(f"{metric} by Model — {ds}")
        ax.set_ylabel(metric)
        ax.set_xlabel("Model")
        ax.grid(axis="y", linestyle=":", alpha=0.6)
        plt.tight_layout()
```

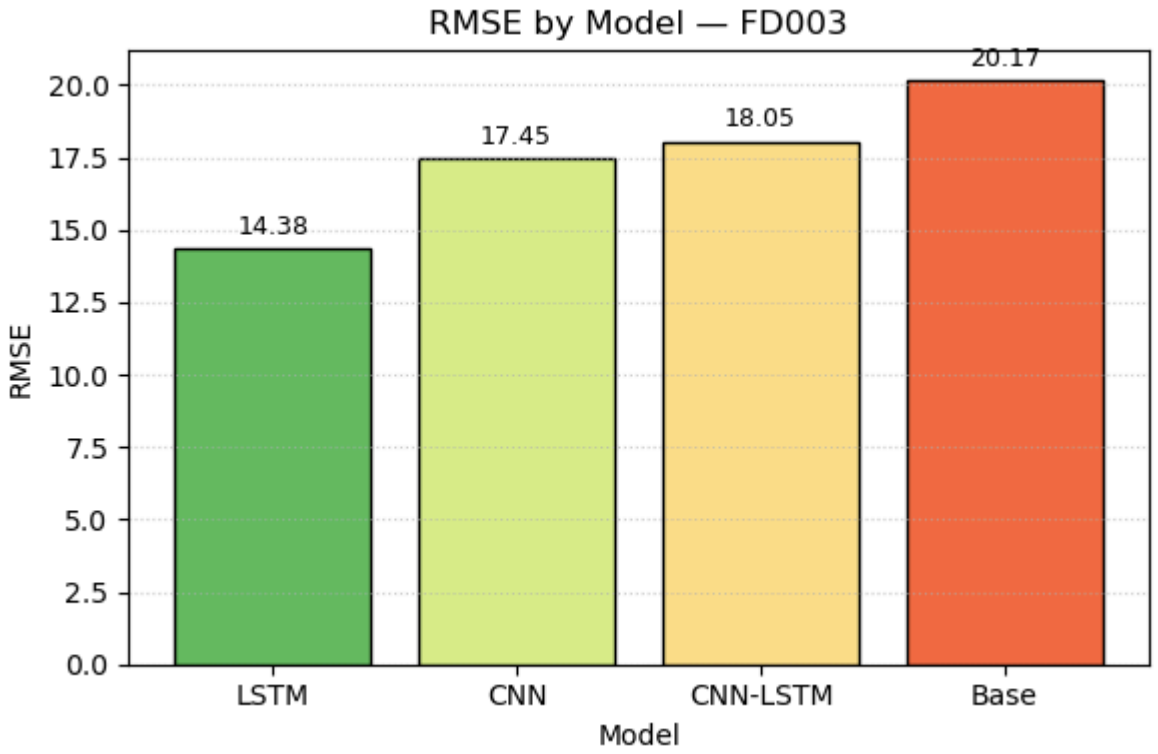
```
42
43          if savepath:
44              fig.savefig(f"{savepath}_{ds}_{metric}.png", dpi=300, bbox_inches="tight")
45          plt.show()
46
47  # --- Test with three palettes ---
```

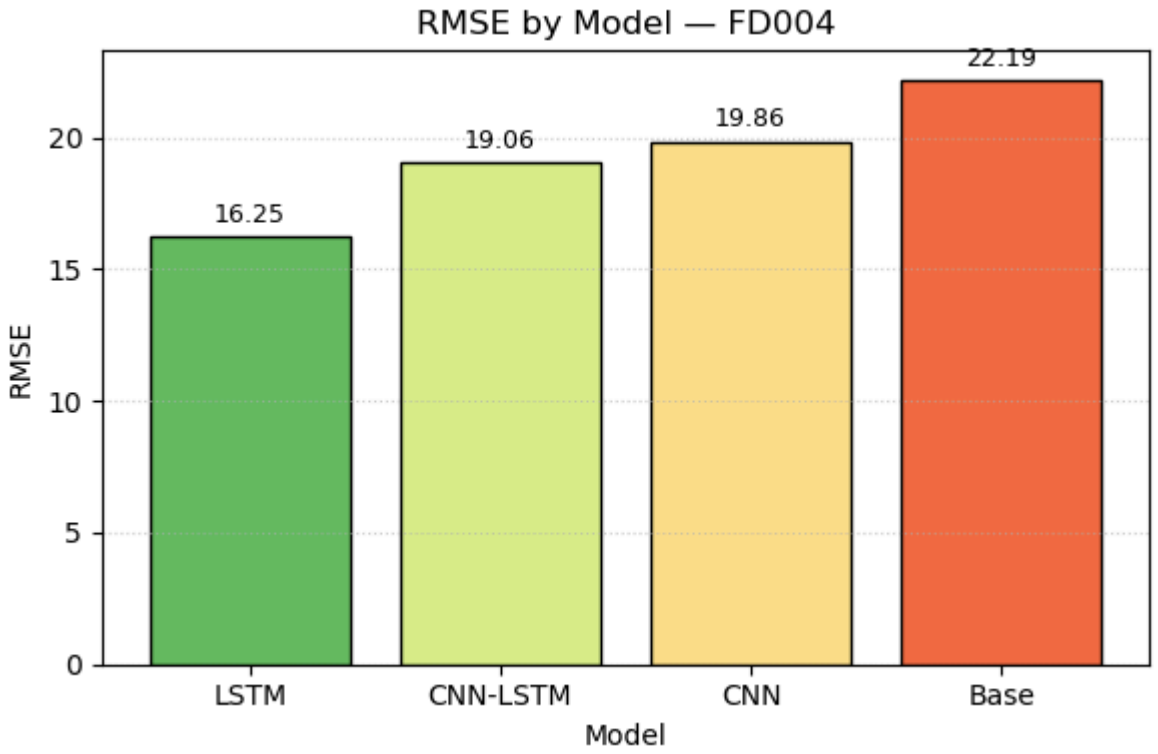
In [30]:

```
# 2) Green-to-red contrast
plot_per_dataset_bars(presentation_df, "RMSE", palette="RdYlGn_r")
```

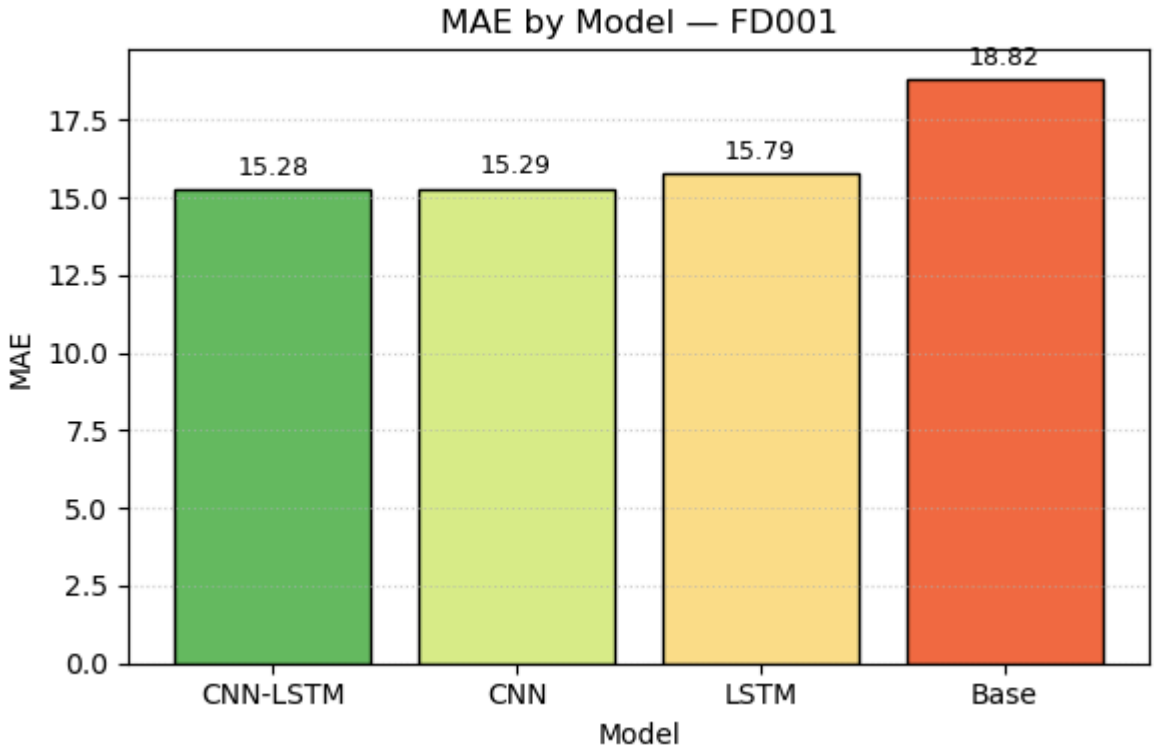


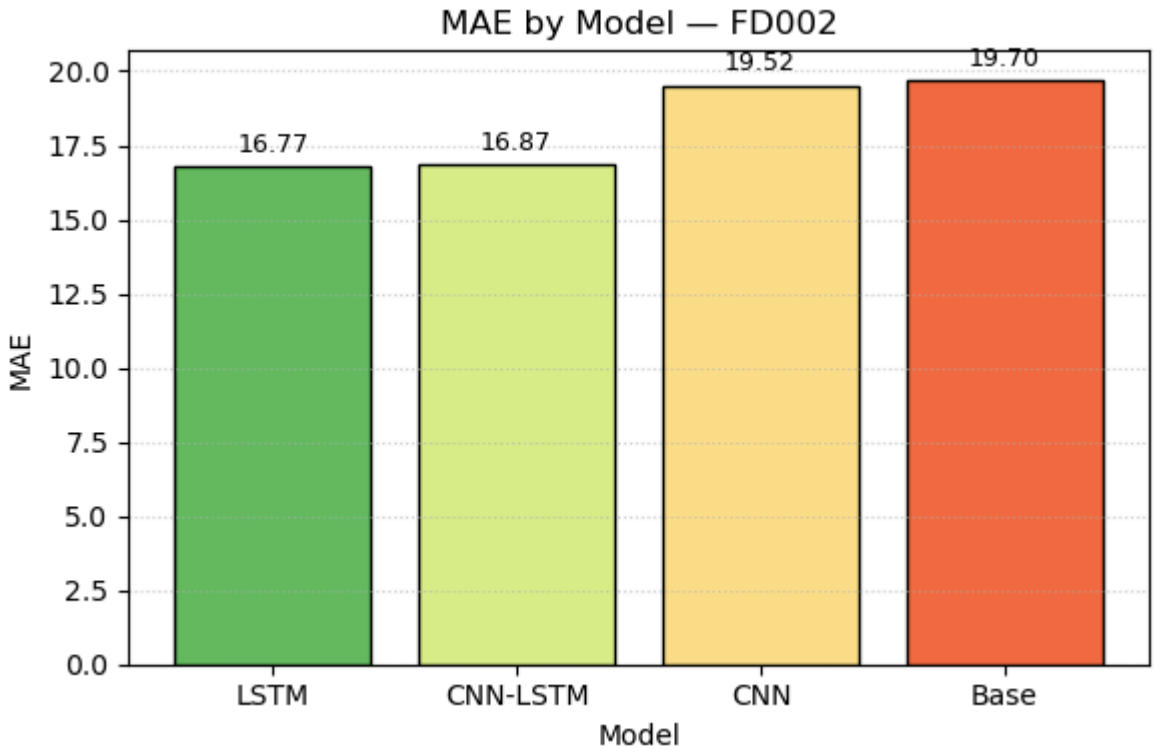

RMSE by Model — FD002
RMSE
Model
0
5
10
15
20
25
21.90
22.68
24.23
24.29
LSTM
CNN-LSTM
CNN
Base

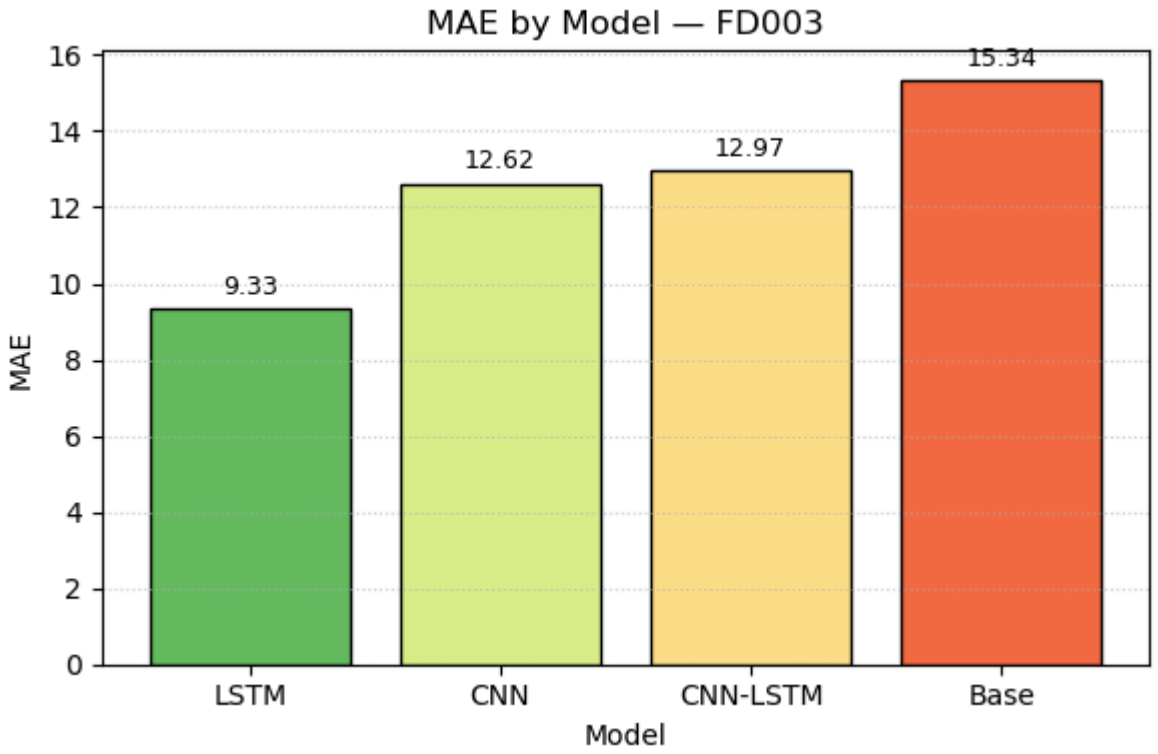

RMSE by Model — FD003
RMSE
Model
LSTM
CNN
CNN-LSTM
Base
14.38
17.45
18.05
20.17
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

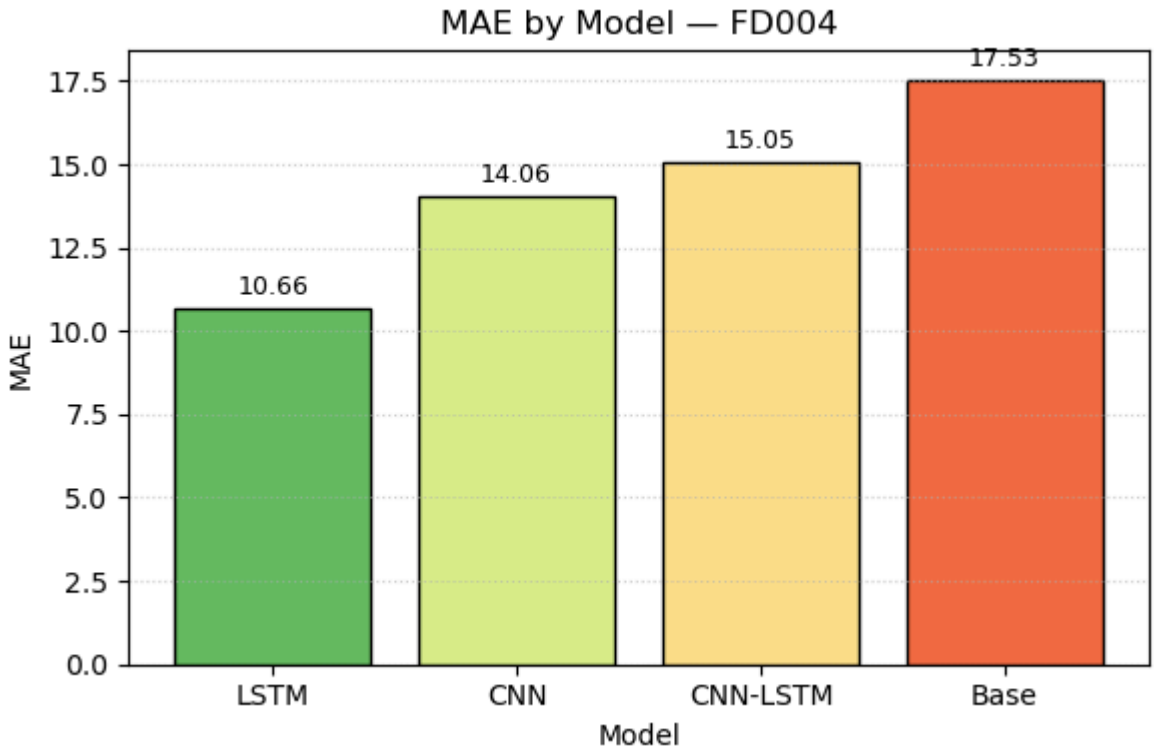

RMSE by Model — FD004
RMSE
Model
0
5
10
15
20
16.25
19.06
19.86
22.19
LSTM
CNN-LSTM
CNN
Base

In [31]:
```
1 plot_per_dataset_bars(presentation_df, "MAE", palette="RdYlGn_r")
```




MAE by Model — FD002
MAE
Model
LSTM
CNN-LSTM
CNN
Base
16.77
16.87
19.52
19.70
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0


MAE by Model — FD003
MAE
Model
LSTM
CNN
CNN-LSTM
Base
9.33
12.62
12.97
15.34
0
2
4
6
8
10
12
14
16


MAE by Model — FD004
MAE
Model
LSTM
CNN
CNN-LSTM
Base
10.66
14.06
15.05
17.53
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5

In [ ]:

```
1
```