In [1]:
```
import duckdb
con = duckdb.execute(
    "IMPORT DATABASE '../data/db'"
)
df = con.execute("SELECT * FROM crew_members_by_date").df()
con.close()
df
```

Out[1]:

In [4]:
```
import plotly.express as px

import plotly.express as px
import pandas as pd

# Ensure datetime type
df["hour_start"] = pd.to_datetime(df["hour_start"])

# Sort data
dff = df.sort_values(["ship_id", "role", "hour_start"])

# Plot: each role gets its own row
fig = px.line(
    dff,
    x="hour_start",
    y="distinct_crew",
    color="ship_id",           # color by ship now, since role is separated
    facet_row="role",          # 👈 put roles in separate rows
    facet_col_wrap=3,          # optional if you have many ships, remove if
    title="Distinct Crew Over Time by Ship and Role",
    labels={"hour_start": "Time", "distinct_crew": "Distinct Crew", "role":
    template="plotly_dark",
)

fig.update_layout(legend_title_text="Ship", hovermode="x unified")
fig.update_xaxes(matches=None, showgrid=True)
fig.update_yaxes(showgrid=True)
fig.update_xaxes(matches='x', showticklabels=True)  # share x-axis
fig.for_each_annotation(lambda a: a.update(text=a.text.split("=")[-1]))  # c
fig.update_layout(height=250 * dff["role"].nunique())  # 250px per row



fig.show()
```

In [5]:
```
con = duckdb.execute(
    "IMPORT DATABASE '../data/db'"
)
df2 = con.execute("SELECT * FROM crew_members_by_dow").df()
con.close()
df2
```

Out[5]:

In [7]:
```
df2.describe()
```

Out[7]:

In [9]:
```
# Barplot of average crew by Day-of-Week and Hour, faceted by Ship (rows) ar

# Prepare day-of-week labels
dow_order = ["Mon", "Tue", "Wed", "Thu", "Fri", "Sat", "Sun"]
df2["dow_name"] = df2["dow"].map(dow_map)
df2["dow_name"] = pd.Categorical(df2["dow_name"], categories=dow_order, orde

# Build a combined categorical for x-axis: "DOW HH"
df2["dow_hour"] = df2.apply(lambda r: f"{r['dow_name']} {int(r['hour']):02d}
# Order x-axis: all hours 00..23 grouped per DOW in calendar order
dow_hour_order = [f"{d} {h:02d}" for d in dow_order for h in range(24)]
df2["dow_hour"] = pd.Categorical(df2["dow_hour"], categories=dow_hour_order,

# Single barplot figure: facets by ship and role
fig_bar = px.bar(
    df2,
    x="dow_hour",
    y="avg_crew",
    facet_row="ship_id",
    facet_col="role",
    category_orders={"dow_hour": dow_hour_order},
    labels={"dow_hour": "Day of Week and Hour", "avg_crew": "Average Crew",
    title="Average Crew by Day-of-Week and Hour, Faceted by Ship and Role",
    template="plotly_dark",
)

# Styling
```

```
fig_bar.update_layout(
    hovermode="x unified",
    bargap=0.1,
    legend_title_text="",
    height=max(400, 280 * df2["ship_id"].nunique()),
    width=max(900, 260 * df2["role"].nunique()),
)
fig_bar.update_xaxes(tickangle=-45, showgrid=True)
fig_bar.update_yaxes(showgrid=True)

# Clean facet labels
fig_bar.for_each_annotation(lambda a: a.update(text=a.text.split("=")[-1]))

fig_bar.show()
```

In [10]:
```
# Single barplot figure: facets by ship and role
fig_bar = px.bar(
    df2,
    x="dow_hour",
    y="max_crew",
    facet_row="ship_id",
    facet_col="role",
    category_orders={"dow_hour": dow_hour_order},
    labels={"dow_hour": "Day of Week and Hour", "max_crew": "Max Crew", "shi
    title="Average Crew by Day-of-Week and Hour, Faceted by Ship and Role",
    template="plotly_dark",
)

# Styling
fig_bar.update_layout(
    hovermode="x unified",
    bargap=0.1,
    legend_title_text="",
    height=max(400, 280 * df2["ship_id"].nunique()),
    width=max(900, 260 * df2["role"].nunique()),
)
fig_bar.update_xaxes(tickangle=-45, showgrid=True)
fig_bar.update_yaxes(showgrid=True)

# Clean facet labels
fig_bar.for_each_annotation(lambda a: a.update(text=a.text.split("=")[-1]))

fig_bar.show()
```

In [11]:
```
# Single barplot figure: facets by ship and role
fig_bar = px.bar(
    df2,
    x="dow_hour",
    y="min_crew",
    facet_row="ship_id",
    facet_col="role",
    category_orders={"dow_hour": dow_hour_order},
    labels={"dow_hour": "Day of Week and Hour", "min_crew": "Min Crew", "shi
    title="Average Crew by Day-of-Week and Hour, Faceted by Ship and Role",
    template="plotly_dark",
```

```
)

# Styling
fig_bar.update_layout(
    hovermode="x unified",
    bargap=0.1,
    legend_title_text="",
    height=max(400, 280 * df2["ship_id"].nunique()),
    width=max(900, 260 * df2["role"].nunique()),
)
fig_bar.update_xaxes(tickangle=-45, showgrid=True)
fig_bar.update_yaxes(showgrid=True)

# Clean facet labels
fig_bar.for_each_annotation(lambda a: a.update(text=a.text.split("=")[-1]))

fig_bar.show()
```

In [ ]: