AWT vs Swing vs JavaFx

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Feature	AWT (Abstract Window Toolkit)	Swing	JavaFX
Generation	First GUI toolkit made for Java, now mostly used for very old or simple programs.	Second GUI toolkit for Java, improved over AWT with more options, still used for many apps.	Newest GUI framework for Java, designed for modern, feature-rich applications with a polished look.
Look & Feel	Uses the native operating system look, so the app can look different on each OS.	Has its own look, apps look and behave the same on all operating systems, fully customizable.	Modern look, can use web-like CSS styles, looks attractive and is easily customizable with effects.
Components	Only basic buttons, textfields, labels, and menus.	Provides many advanced components like tables, trees, tabbed panes, color choosers, etc.	Has most component types, including charts, web browser panels, sliders, media players, and more.
Customization	Hard to change how things look beyond the basics; limited control.	Easier to change component colors and styles; supports pluggable "look and feel" themes.	Very easy to style every detail using CSS; supports animations, transitions, and visual effects.
Rendering	Depends on the native OS, sometimes looks inconsistent across platforms.	Draws all components using Java code (lightweight); looks the same everywhere.	Uses hardware acceleration (uses your graphics card) for smooth graphics, effects, and animation.
Media Support	Can play simple audio files, but no video support built-in.	Can do audio and video with extra libraries, but not built-in or straightforward.	Built-in support for both audio and video, plus image and web content, great for multimedia apps.
Animation	No direct support for animations at all.	No built-in animation features; would need manual coding.	Built-in support for advanced animations and transitions, making it easy to create dynamic interfaces.
Layout Managers	Few layout managers, not very flexible.	Many layout managers available, making complex UIs easier.	Layout is flexible and modern; can use FXML to separate UI from code and build UIs visually.
UI Design Tools	No drag-and-drop design tools.	Some tools available (like NetBeans GUI Builder).	Supports Scene Builder, a drag-and-drop interface builder; also supports FXML for separation of design.

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Touch/Modern Input	No support for touch, gestures, or modern devices.	No built-in support for touch screens or gestures.	Supports touch input, gestures, and is suited for tablets and modern devices.
Best Use Today	Outdated; use only for maintaining very old programs.	Good for maintaining older desktop applications; still used for business desktop apps.	Recommended for all new Java desktop apps; best for modern, interactive, multimedia-rich applications.
Ease of Learning	Easiest to learn for very basic, simple GUIs.	Medium; more components/features to learn than AWT.	Hardest to master, but worth it for modern features and appearance.